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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H04M 1/00, 1/56, 3/00, 11/00, 15/06

A1

(11) International Publication Number: **WO 99/55058**

(43) International Publication Date: 28 October 1999 (28.10.99)

(21) International Application Number: PCT/IL99/00206

(22) International Filing Date: 16 April 1999 (16.04.99)

(30) Priority Data:

124117	16 April 1998 (16.04.98)	IL
128324	1 February 1999 (01.02.99)	IL

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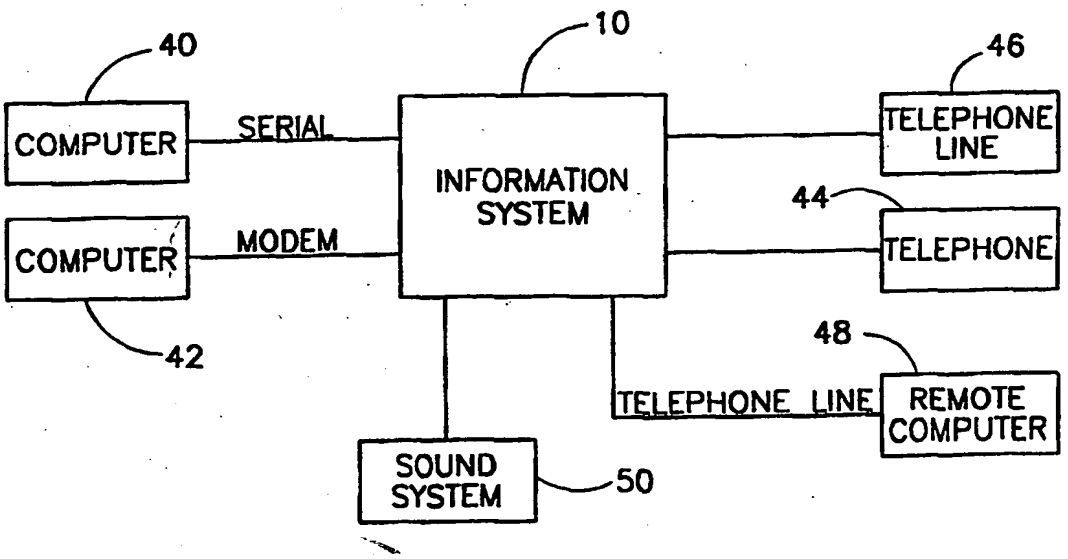
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: PERSONALIZED INFORMATION SYSTEM



(57) Abstract

A method of information search comprising an externally maintained database (40, 42, 48) or a personal database (10) of telephone numbers to provide a search criteria and match the search criteria against the two databases to generate a single list of search results. The externally maintained database (40, 42, 48) and the personal database (10) may each be stored locally and/or at a remote location. Preferably, the remote location is at a telephone company (48).

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PERSONALIZED INFORMATION SYSTEM

FIELD OF THE INVENTION

The present invention relates to dedicated personal information systems, especially for telephone numbers and in particular to personal information systems which are integrated with telephone usage.

BACKGROUND OF THE INVENTION

Many individuals maintain long lists of names associated with telephone numbers, addresses and other personal information. With the advent of electronic miniaturization, personal organizers have been developed which not only contain the lists but also allow a user to search through the lists using various search mechanisms. One limitation of such organizers is that a user is usually required to enter the personal information and most users are too lazy to perform the data entry.

The entire listing of names, addresses and telephone numbers for a geographical region has traditionally been organized in paper bound books. A "white pages" book contains a complete listing, by alphabetical order of all the telephone numbers. A "yellow pages" book contains commercial listings, by a subject index and also includes some promotional material. A typical household may have several pounds of paper, which may need to be replaced periodically.

It is also possible to obtain such a listing in the form of a database, for example on a CD-ROM and to search the database using a special purpose program. Another computerized method of performing such searching is provided by on-line services, either direct dial-up services, such as the MiniTel system used in France or Internet provided services. One limitation of most computer based solutions is that computers, and especially their input devices, are too sensitive to be placed in harsh or dirty environments, such as a kitchen. In addition, most computers are difficult for a computer-illiterate to operate. The size of the computer and/or its input and output devices are also generally unsuitable for many environments, such as kitchens.

It is also possible to dial a voice information service which provides (usually using a human operator) a telephone number in response to a voice request. However, there is an uncertain waiting time and some queries may be expensive.

SUMMARY OF THE INVENTION

It is an object of some embodiments of the present invention, to provide a dedicated telephone number/personal information look-up system which is easy to use. Additionally or alternatively, such a system preferably has a short response time. Additionally or alternatively,

such a system is adapted to be used in dirty and/or crowded environments, such as a kitchen. Preferably, the system is enclosed in a moisture resistant housing and/or is coated with a moisture-resistant coating. Alternatively or additionally, the system has a small footprint and/or is flat and sturdy so that it can be stacked and/or mounted on a wall.

An object of some preferred embodiments of the present invention is to provide a method and apparatus which allow a user to easily enter telephone related information, using a minimum of effort and, preferably, to assist the user in conveying the information, once entered, to different locations. In a preferred embodiment of the invention, the apparatus may be used to control various telephone services, such as voice-mail, in a friendlier manner than possible using IVR (interactive voice response). In other preferred embodiments of the invention, the apparatus may be integrated with a telephone company service installation.

An object of some preferred embodiments of the invention is to provide various services at a telephone interchange, preferably using a standard telephone as the interface. Preferably, the services include the storage of personal database information.

In a preferred embodiment of the invention, the system includes a personalized information database ("personal database") and a preferably large externally provided information database ("external database").

One aspect of some embodiments of the present invention relates to applying a single search to both the personal database and to the external database.

An aspect of some preferred embodiments of the invention is the utilization of a dedicated system. When using a general propose computer or even a personal organizer, a user must perform some sort of prelude activity, before starting the search. This activity may include running a program, switching between active windows, selecting a function, etc. In a preferred embodiment of the invention, a dedicated system is configured so that any input is applied immediately towards performing a search.

An aspect of some preferred embodiments of the present invention, relates to a particular hardware architecture for a dedicated personal information retrieval system. Preferably, such a system includes a mass-storage medium and a central processing unit (CPU), but does not comprise a bus connecting the two. Preferably, the mass storage medium is controlled by a second CPU which is preferably directly connected to the first CPU, preferably, using I/O ports on the CPU. Preferably, the first CPU is used to control a display and a data input device, such as a keyboard and/or a touch-screen. Preferably the external database is stored on the mass-storage medium. Preferably, the personal database is stored in a flash memory and/or in some other type of electronic random access memory.

An aspect of some preferred embodiments of the invention, relates to automatically updating and/or loading the personal database. Preferably, the mass-storage medium is a removable mass-storage medium, such as a CD-ROM. When a new CD-ROM is inserted, various pieces of information in the personal database are preferably updated. Preferably, the updating is automatic. Alternatively, the updating of the information requires a user acknowledgment. Preferably, each updated piece of information requires an acknowledgment. Alternatively, the entire update requires only a single acknowledgment.

In a preferred embodiment of the invention, the update is performed by automatically downloading information from a remote service provider. Preferably, such updating is limited only to the personal database. Alternatively, the updating may include the external database or portions thereof. In one preferred embodiment of the invention, the updated information is requested by the dedicated information system. Alternatively or additionally, the sending of information is initiated by the remote service provider. Preferably, data updates are based on a subscription to general data updates from a remote service provider. Alternatively or additionally, the data updates may be based on a previously requested update profile. In one preferred embodiment of the invention, only particular groups of entries in the database are automatically updated.

An aspect of some preferred embodiments of the invention is related to annotation of the external database. Preferably, instead of copying information from the external database to the personalized database, as might be preferred if the two databases are separately searched, the personal database contains a pointer to the external database. When a user changes the data associated with a personal entry and/or adds additional information (such as an e-mail address), the additional information is preferably stored in the personal database, separate from the external database. Preferably, the pointed-to information is also copied to the personal database, in case the external database is removed. Thus, if the external database is changed, the system does not lose any information. Preferably, each entry in the external database is assigned a unique identifier, so that the entry will be identifiable even if the entity referred to by the name changes its name, address or even its telephone number. Preferably, especially when performing such a complete update, an automatic annotation is made to the entry, which annotation indicates the original content of the entry.

An aspect of some preferred embodiments of the invention relates to data entry using the system. In accordance with a preferred embodiment of the invention, various appliances and/or products are shipped with a CD-ROM (or other electronically or optically readable media). This CD-ROM preferably includes information for contacting repair services for the

appliance and/or user manuals for the appliance. When the CD-ROM is inserted, entries in the personal database are updated to reflect the preferred repair service for the appliance. Preferably, the repair service is automatically selected from a list, responsive to the geographical location of the dedicated information system. Preferably, this location is based on the telephone number and/or determined by a user entering that information. In a preferred embodiment of the invention, the dedicated information system is used for viewing the user operation manuals for the appliance.

In a preferred embodiment of the invention, the dedicated information system is connected to a computer. When a CD-ROM is inserted into the CD-ROM reader, data is preferably read from the CD-ROM and uploaded to the computer. Alternatively, when a CD-ROM is inserted into a CD-drive on the computer, the computer updates the dedicated system. Preferably, the computer is connected to the dedicated information system using a serial port. Preferably, the serial port is used to control and/or download information to and/or from the dedicated information system. In a preferred embodiment of the invention, the dedicated information system is connected on a telephone line which is connected to the computer. Preferably, the system is connected between the computer and a wall outlet, alternatively, the two are connected in parallel to a common telephone line.

In accordance with a preferred embodiment of the invention, the system may be connected to one or more peripherals, preferably using a serial connection and/or a wireless connection, such as IR. Preferably, the peripherals are used for input and/or output.

An aspect of some preferred embodiments of the present invention relate to smart searching through the databases. In accordance with a preferred embodiment of the invention, a search is performed by matching the various entries to search criteria, and presenting the entries in order of their match quality. In a preferred embodiment of the invention, the search criteria comprise a prefix of words in the database entries. Preferably, when a user enters a letter, this letter is appended to previously entered letters to form a prefix, which is matched against database entries. Preferably, the first shown matches are those that were recently used. Additionally or alternatively, the matches shown first are those which are in the near geographical area and/or some chosen geographical area. Preferably, the matching corrects spelling errors and/or takes into account different possible renditions of phonetically similar words. Alternatively or additionally, the search mechanism automatically completes words. In a preferred embodiment of the invention, correction and/or completion of words takes into account characteristics of the human auditory system, for example, a user might not remember if the word is "shira" or "mira". In a preferred embodiment of the invention, when there are

many matching entries, the entries which had been previously used by the user are marked. Alternatively or additionally, the entries are ordered in order of last usage. In a preferred embodiment of the invention, the system learns a particular user's error pattern and chooses matches and/or makes corrections based on the pattern.

An aspect of some preferred embodiments of the invention relates to various types of output from the dedicated information system. In one preferred embodiment of the invention, data is outputted on a display, preferably an LCD display. In a preferred embodiment of the invention, the size of the font used for display is selectable so that it fits the need of vision-impaired individuals. In one preferred embodiment of the invention, the dedicated information system includes a dialer which dials a selected telephone number. In various preferred embodiments of the invention, the dialer may include one or more of ISDN dialing, acoustic dialing and POTS analog dialing. Additionally or alternatively, the dedicated information system can convert stored information into speech patterns, so that it can read-out (audible) telephone numbers, addresses and other associated information.

An aspect of some preferred embodiments of the invention relates to queue management. In accordance with a preferred embodiment of the invention, a user can set the dedicated information system to dial a list of entries, generated as a result of a search and/or as a result of a manual selection. Preferably, the dedicated information system includes a telephone handset which can be used for a telephone conversation. Preferably, the system lists all the entries which have been called. In a preferred embodiment of the invention, especially useful where the list is a list of relevant businesses generated by a search or when the list is a list of persons to invite to a party, the user can annotate the queue various information regarding these entries, for example, price (business list) or response to invitation (party list).

An aspect of some preferred embodiments of the invention relates to using a dedicated information system to improve various telephony services. In accordance with one preferred embodiment of the invention, incoming voice mail messages are displayed including personal information relating to the caller. Alternatively or additionally, persons who leave voice mail may be automatically entered into the personal database and/or provided to a user for annotation. Preferably, the voice-mail messages are accessed non-sequentially. In accordance with another preferred embodiments of the invention, e-mail messages may be read-out by a telephony service provider.

It should be appreciated that in some cases the telephony service provider will not be the telephone service operator. For example, voice mail services may be provided by a private operator.

In accordance with another preferred embodiment of the invention, when a user calls up an IVR server, the IVR server downloads data which the dedicated information system can display as menus and/or as information additional to what is presented audibly. Preferably, such information is multiplexed on the telephone conversation signal. Alternatively or additionally a separate telephone line may be used for this purpose. Preferably, the call is initiated from the data line so that the two calls are synchronized. Alternatively, the IVR provider uses caller ID information to identify a data call and an IVR call as a single client. Alternatively, a special code is provided to allow either to the data call or to the IVR call to be conferenced with the other conversation and create the synchronization. Alternatively or additionally, the calls are made using two or more channels on an ISDN line. Alternatively or additionally, in a cellular telephone, some of the data packets transmitted to the telephone may include information to be displayed, which information preferably relates to an IVR conversation.

An aspect of some preferred embodiments of the invention relates to carrier wave information transfer. In accordance with one preferred embodiment of the invention, information which is transmitted by carrier wave (such as caller ID information) is stored in the personal database. Additionally or alternatively, when displaying such information, a portion or all of a data record associated with the caller may be displayed. Additionally or alternatively, when a user calls up a directory service, the service calls back with the requested information being transmitted on a carrier wave. Preferably, this information is used to update the personal database. Preferably, the personal database is automatically updated. It should be appreciated that the information may include "name" and "address", as well as "telephone number". Alternatively or additionally, the information can include generated information, for example calling statistics. In addition, if the calling number is secret, other identifying information, such as suggested by the caller, may be provided instead (e.g., a nickname). In a preferred embodiment of the invention, a user can request only information associated with a number. Preferably, the user calls up a directory service, provides a telephone number, other identifying information or search criteria and receives the associated information by return carrier wave or other methods described herein. Preferably, the user dials the number to be requested, so the process can be semi-automatic or even completely automatic (if the information system performs the dialing itself, for telephone numbers for which it requires information).

In a preferred embodiment of the invention, a carrier wave indication is transmitted to a dedicated system by a service provider and/or by the telephone company when there is data

ready to be transferred. Such an indication may be used for e-mail, for external database updates, for personal database updates and/or for other information. Additionally or alternatively, a dedicated system can "answer" such a signal by answering the incoming call after or within a predetermined number of rings. The downloaded information and/or the carrier wave signal are preferably originated at the telephone company.

In one preferred embodiment of the invention, the external database is not locally stored at the system. Rather, the external database is accessed by a remote connection. Alternatively or additionally, the annotations and/or the personal database are also remotely stored. Alternatively or additionally, the search itself is performed at the remote location. Generally however, the search criteria will be provided at the dedicated information system.

An aspect of some preferred embodiments of the invention relates to embodiments where the personal database is stored at a remote location. Preferably, the personal database is stored at a telephony service provider, which may or may not be the provider of the telephone service itself. The external database may be stored at the dedicated information system, at the same service provider or at a different service provider. In some preferred embodiments of the invention, more than one external database is provided, possibly each being stored at a different location. In addition to a personal database at a service provider, an additional personal database may be stored at the dedicated information system.

One advantage of the personal database being stored at the service provider is that a user can use the personal database from any location and is not required to carry it around. This is especially useful for cellular telephone users and/or for users who are mobile and move from location to location.

An advantage of some preferred embodiments of the invention, is that the personal database and its functionality can be accessed using a standard telephone. Preferably, an enhanced interface is available if a dedicated information system, such as described above, having a keyboard and/or a display, is used. Alternatively or additionally, an ISDN telephone may be used.

In a preferred embodiment of the invention, data and/or instructions are entered using the telephone keypad. Preferably, the information is entered using the letter codes (three for each number). Alternatively or additionally, an IVR interface is used. Alternatively or additionally, the information is entered using voice input. It should be appreciated that voice recognition for a single user and/or limited subject matter is within the current state of the art. Preferably, voice prints of the user are stored with his personal database. In a preferred embodiments of the invention, such voice prints are used as a user identification scheme to

limit unauthorized access to the personal database. Alternatively or additionally, a password is used to limit access.

An advantage of some preferred embodiments of the invention is that fewer components need to be purchased by a user in order to operate a service provided from a remote location as compared to a computer and/or a full-fledged dedicated information system.

An advantage of some preferred embodiments of the invention is that there is a smaller (than other embodiments) amount of information transmitted between the service provider and the user's dedicated information system. Preferably, when a call is placed to or from any one of a user's designated telephone numbers, the personal database may be updated by and at the telephone operator. Alternatively, such information may be transmitted from the telephone service operator to a personal database service provider. In addition, when a user calls up an information service, the personal database can be directly updated.

In a preferred embodiment of the invention, a user can instruct the telephone service operator to perform telephone operations, such as queue management, returning telephone calls, creating telephone conferences and call-back, by providing instructions relating to the personal database. In one example, the user instructs the telephone service operator to call up entries one through six. In another example, the user asks the service operator to call up a person at one of his plurality of possible telephone numbers. Preferably, such instructions are performed using key commands, voice commands, IVR or a remote computer connection, such as via the Internet, possibly using the WWW or e-mail. However, in some preferred embodiments of the invention, such commands may be provided using a human operator.

An advantage of the proximity between the telephone service provider and the personal database, is the possibility of automatic updates of the personal database when information changes in the telephone service provider's database. Alternatively or additionally, such information is changed only when an attempt is made to call up a changed number. Preferably a user is prompted before changing. Such prompts are preferably provided as voice messages.

In accordance with another preferred embodiment of the invention, a user can order reports from the personal database provider. Preferably, one of these reports is a personal telephone book which can be generated from the personal database. Such reports may optionally be delivered by e-mail.

In accordance with a preferred embodiment of the invention, the personal database can be updated by user entry of data and/or deletion of data. Alternatively or additionally, a user can update the database by e-mail. Alternatively or additionally, a data-file, such as from a computer database, may be uploaded using a modem. Alternatively or additionally, data may

be added or deleted using a Web page interface. Alternatively or additionally, a user can send an update from his personal database to another user's personal database. Alternatively or additionally, a user can send a special "business card" to another user's personal database. Alternatively or additionally, a user can send information to another user's personal database, while in the middle of a conversation, by dialing numbers on the telephone keyboard. Preferably, a special code is used to avoid inadvertent data entry. Alternately or additionally, a set of entries may be transmitted from a personal database to another user's personal database, for example to maintain telephone listings of classmates.

In a preferred embodiment of the invention, a person who is mobile can send his current telephone number to personal databases of people who may desire to contact him. Alternatively, the people can retrieve the number from the person's personal database.

In a preferred embodiment of the invention, security measures and/or access limitations are preferably applied to portions of the personal database, so that an outside agency will not corrupt them. Such limitations may include who is allowed to update, read, add and/or delete, which portions of the database. Preferably, there are several portions of the database, each one with a different security level. In a preferred embodiment of the invention, the above methods of updating a personal database may also be used to download information from a personal database. In particular, an e-mail request may include a query to be performed on the personal database.

In a preferred embodiment of the invention, a personal database and/or a dedicated information system may be contacted to put together a conference call to a certain group. Alternatively or additionally, a person can call up his personal database or his dedicated information system from a remote location and ask to be called back and/or put in contact with a particular entry.

It should be appreciated that many of the above applications can utilize a dedicated information system instead of or in addition to a remote personal database. However, using a dedicated personal system for these applications may require an additional telephone line and/or increased data traffic. It should be appreciated that the converse is also true, that many of the applications described herein with reference to a dedicated information system can also be performed if the personal database is stored at a remote location and if the device which performs the various functions is actually part of the telephone switching network.

An aspect of some preferred embodiments of the invention relates to generating information or an information update for a personal database from CDRs (call data records) which are accumulated by a telephone service provider and/or a PBX. CDRs are ordinarily

accumulated by a telephone company, for example for billing purposes. In a preferred embodiment of the invention, fake CDR records are generated for in-coming calls, by analysis of caller ID information and/or by analyzing CDRs of the callers. In a preferred embodiment of the invention, the association of CDR records with a particular extension number in a PBX is determined by matching the CDR records with call records stored at the PBX.

An aspect of some preferred embodiments of the invention relates to combined Internet and telephony services. In a preferred embodiment of the invention, a user can perform searches and/or select persons to be contacted. Then, the Internet is used to instruct the telephone company to connect the call and/or a conference. Preferably, a user can instruct the telephone company to perform certain activities if the connection is unavailable (e.g., busy, not answering), for example, leaving a message.

There is thus provided in accordance with a preferred embodiment of the invention, a method of telephone number entry, comprising:

dialing a telephone number on a telephone line, to make a telephone connection;

automatically detecting and storing said telephone number by an information system, in a personal database which detecting and storing is controllable by a person who performs said dialing; and

associating the telephone number with information relating to the telephone number, for said storage which information exists in an external database. Preferably, said information system eavesdrops on said telephone line. Alternatively or additionally, said call is placed through said information system. Alternatively or additionally, said storing comprises storing additional information in association with said telephone number. Alternatively or additionally, said information system is integrated with a telephone company through which the call is routed. Alternatively, said information system is a stand-alone device.

Alternatively, said external database is integrated with a telephone company through which the call is routed and said method comprises requesting said information from the telephone company by said information system. Preferably, said information is transferred by carrier wave.

In a preferred embodiment of the invention, said method comprises matching said telephone number to said personal database and requesting said information only if said match fails.

In a preferred embodiment of the invention, said method comprises prompting a user whether to request said information and requesting said information responsive to said user's response to said prompt.

In a preferred embodiment of the invention, said telephone company sends said information only if a user pre-dials a data-request code.

In a preferred embodiment of the invention, said dialing is detected by a DTMF receiver. Alternatively or additionally, said dialing is performed while the telephone line is active. Alternatively or additionally, said dialing is performed by the initiator of the call for which the line is active. Alternatively or additionally, said dialing is performed by the receiver of the call for which the line is active.

There is also provided in accordance with a preferred embodiment of the invention, a method of telephone number entry, comprising:

dialing in to a telephone line to make a telephone connection, wherein the originating telephone number is provided by a carrier wave;

automatically detecting and storing said telephone number, in a personal database, by an information system which eavesdrops on the telephone line, which detecting and storing is controllable by a person who performs said dialing; and

associating the telephone number with information relating to the telephone number, for said storage which information exists in an external database.

There is also provided in accordance with a preferred embodiment of the invention, a method of telephone number entry, comprising:

making a telephone connection, wherein one of the parties is a particular telephone line having a telephone number;

associating the telephone number with information relating to the telephone number; and

a telephone company automatically detecting and storing said telephone number and information associated with said telephone number, in a personal database associated with said telephone line, which detecting and storing is controllable by a person who is party to said call;

In a preferred embodiment of the invention, the method comprises displaying said information, during said call. Alternatively or additionally, said user controls said storing by setting storage logic options. Preferably, said user sets said storage options via an Internet. Alternatively, said user sets said storage options via a WWW browser.

There is also provided in accordance with a preferred embodiment of the invention, a method of telephone number entry, comprising:

dialing a directory information service to make a telephone connection, on a telephone line to determine a telephone number; and

automatically detecting and storing said telephone number, in a personal database, by an information system which eavesdrops on the telephone line,

wherein said directory service is a voice service which provides a voice output of the telephone number. Preferably, said information system comprises a speech recognizer. Alternatively or additionally, said information system is integrated with said directory information service and wherein said storing is at said information system. Alternatively or additionally, said directory information service mixes computer understandable information with said voice output. Preferably, said computer information is transferred in a burst mode, without a carrier wave. Alternatively or additionally, said computer understandable information is provided after the voice output. Alternatively or additionally, said computer understandable information is provided before the voice output.

In a preferred embodiment of the invention, said telephone number is provided by carrier wave after said dialing. Preferably, said telephone number is provided by carrier wave after said dialing only if requested by a user.

In a preferred embodiment of the invention, said automatically detecting and storing comprises matching said number against said personal database and storing said number only if said number is not in said database. Alternatively or additionally, said automatically detecting and storing comprises prompting a user if to store said number and storing said number responsive to said prompt. Alternatively or additionally, said automatically detecting and storing comprises storing said number only if a user dialed a special store-request code. Alternatively or additionally, storing comprises:

matching said number with information;

displaying said number and said information to a user; and

storing said number responsive to the user's response. Preferably, said storing said number comprises storing said matched information.

In a preferred embodiment of the invention, said automatically detecting and storing comprises storing only a single copy of said number. Alternatively or additionally, automatically detecting and storing comprises storing during said telephone connection. Alternatively or additionally, automatically detecting and storing comprises storing after said telephone connection. Preferably, automatically detecting and storing comprises analyzing CDR records of said telephone line. Alternatively or additionally, automatically detecting and storing comprises analyzing CDR records of other telephone lines.

There is also provided in accordance with a preferred embodiment of the invention, a method of dial code selection comprising:

storing, at and by a telephone company, a telephone number in a database associated with a particular user or telephone number; and

automatically assigning, by a telephone company, a shortened dial code for the stored telephone number. Preferably, the method comprises receiving an "add to list" command from said user, regarding said telephone number, to prompt said storing. Alternatively or additionally, the method comprises automatically detecting said number using a DTMF receiver. Alternatively or additionally, the method comprises automatically detecting said number based on a second user calling said first user. Alternatively or additionally, the method comprises printing a list of said numbers and said shortened dial codes.

There is also provided in accordance with a preferred embodiment of the invention, a method of data entry into a personal database, associated with a telephone line and stored at a telephone company which services said line, comprising:

automatically detecting requests for connection to another telephone number on said line; and

adding said another telephone number to said database. Preferably, said requests comprise an incoming call. Alternatively or additionally, said requests comprise an outgoing call. Alternatively or additionally, said requests comprise an incoming call which left a message on a voice mailbox.

There is also provided in accordance with a preferred embodiment of the invention, a method of automatically updating telephone information in a system comprising:

providing a computer media reader and a database of telephone numbers;

inserting a computer readable storage medium into the reader; and

automatically updating, using a computer, a plurality of individual records in said database, utilizing information read from said medium by said reader, wherein said storage medium comprises an externally maintained database and wherein said database of telephone numbers of said system comprises a personal database. Preferably, said personal database comprises annotations to records in said externally maintained database.

There is also provided in accordance with a preferred embodiment of the invention, a method of automatically updating telephone information in a system comprising:

providing a computer media reader and a database of telephone numbers; and

inserting a computer readable storage medium into the reader; and

automatically updating, using a computer, a plurality of individual records in said database, utilizing information read from said medium by said reader, wherein said

information in said medium comprises records associated with a particular service and wherein said personal database comprises records associated with a plurality of services.

In a preferred embodiment of the invention, said system comprises a general purpose computer. Alternatively, said system comprises a dedicated personal information system.

There is also provided in accordance with a preferred embodiment of the invention, a method of personal telephone database management, comprising:

(a) obtaining call data records (CDRs) of at least a particular telephone line;

(b) associating additional information with at least selected ones of said CDRs; and

(c) generating or updating a personal database utilizing said selected CDRs and associated information. Preferably, the method comprises generating pseudo CDRs for incoming calls and using said pseudo CDRs to generate or update a personal database. Preferably, said pseudo CDRs are generated by analyzing CDRs of other telephone lines. Alternatively or additionally, said pseudo CDRs are generated by analyzing caller ID data, when calls are made.

In a preferred embodiment of the invention, the method comprises querying a telephone company for a list of telephone lines which called the particular line. Alternatively or additionally, the method comprises filtering said CDRs before said associating. Alternatively or additionally, the method comprises filtering said CDRs after said associating. Alternatively or additionally, said updating comprises updating a personal database at said telephone company. Alternatively or additionally, said updating comprises transmitting a database update to a user. Alternatively or additionally, said updating comprises generating a personal database. Alternatively or additionally, said updating comprises generating an update for an existing personal database. Alternatively or additionally, the method comprises matching said CDRs against call records from a PBX, to associate CDRs with a particular extension of said PBX. Alternatively or additionally, the method comprises associating "add-to-list" commands with said CDRs. Preferably, the method comprises marking a CDR responsive to an "add-to-list" command received in association with a call which generates the CDR.

There is also provided in accordance with a preferred embodiment of the invention, a method of call data record (CDR) marking, comprising:

receiving, at a telephone company, a command is associated with a telephone call that is received from one of the parties of said call; and

annotating a CDR associated with said call, responsive to said command. Preferably, said command comprises an "add-to-list" command. Alternatively or additionally, receiving

comprises receiving via an Internet connection. Alternatively or additionally, receiving comprises receiving via a dedicated telephone connection. Alternatively or additionally, said command is received just prior to said telephone connection. Alternatively or additionally, said command is received during said telephone connection. Alternatively or additionally, said command is received just after said telephone connection. Alternatively or additionally, receiving comprises receiving via a telephone connection of said call.

There is also provided in accordance with a preferred embodiment of the invention, a method of personal database management, comprising:

providing an external database of telephone numbers;

maintaining a database of annotations of records in the external database; and

automatically generating annotations in said database of annotations responsive to a telephone call usage pattern of individual telephone numbers.

There is also provided in accordance with a preferred embodiment of the invention, a method of personal database management, comprising:

providing an external database of telephone numbers; and

maintaining a database of annotations of records in the external database,

wherein said annotations comprise links to records in the external database.

In a preferred embodiment of the invention, said external database is removable. Alternatively or additionally, said external database is located at a remote location.

There is also provided in accordance with a preferred embodiment of the invention, a method of database maintenance for a personal database of telephone numbers stored at a telephone company, comprising:

providing a second database at said telephone company; and

transferring information from said second database to said personal database.

There is also provided in accordance with a preferred embodiment of the invention, a method of database maintenance, for a database of personal telephone numbers stored at a telephone company for a telephone subscriber, comprising:

providing information for updating said database; and

electronically uploading said information, by said telephone subscriber, to said telephone company; and

updating said database using said uploaded information.

In a preferred embodiment of the invention, electronically uploading comprises sending e-mail. Alternatively or additionally, electronically uploading comprises uploading via an interactive Internet connection.

In a preferred embodiment of the invention, the method comprises retrieving information from said database using a second electronic connection. Preferably, said retrieving uses a same connection type as said uploading.

In a preferred embodiment of the invention, said information comprises information to be stored in said personal database. Alternatively or additionally, said information comprises instructions for automatic personal database generation or updating.

There is also provided in accordance with a preferred embodiment of the invention, a method of database maintenance, for a personal database of telephone numbers stored at a telephone company, comprising:

generating a request to download information from said personal database;

transmitting said request to said telephone company

electronically downloading said information from said personal database. Preferably, said electronic downloading comprises downloading directly into a cellular telephone. Alternatively or additionally, said request comprises a request for only a portion of the database. Alternatively or additionally, said request comprises a sorting order.

There is also provided in accordance with a preferred embodiment of the invention, a method of managing a voice mailbox stored at a telephone company, comprising:

listing incoming messages on a display associated with a telephone subscriber and remote from said telephone company; and

selectively listening to one of said incoming messages. Preferably the method comprises sending, via carrier wave, elements of said list. Preferably, said elements comprise an originating telephone number associated with a message on said voice mailbox.

In a preferred embodiment of the invention, said messages comprises e-mail messages. Preferably, said listening comprises reading out an e-mail message by said telephone company. Alternatively or additionally, said messages comprises voice messages.

There is also provided in accordance with a preferred embodiment of the invention, a method of requesting information, comprising:

dialing an information-provision system to obtain information;

hanging up after said dialing; and

sending information, by carrier wave, directly to an information system for which the information was obtained, after said hanging up. Preferably, said information provision system comprises a voice-information provision system. Alternatively or additionally, said information provision system comprises an IVR-information provision system. Alternatively or additionally, the method comprises requesting information from said information provision

system. Alternatively or additionally, said dialing acts as an information request from said information provision system. Alternatively or additionally, the method comprises receiving a voice response from said information provision system. Preferably, said voice response is provided during a call initiated by said dialing. Alternatively or additionally, said voice response is provided during a call-back call.

There is also provided in accordance with a preferred embodiment of the invention, a personal database component integrated with a telephone interchange, comprising:

a telephone interchange;

a database including a plurality of entries for telephone numbers and associated information, integrated with said interchange; and

an association of said database with at least two different telephone numbers. Preferably, said at least two different telephone numbers are used by a single user. Preferably, a single database is associated with fewer than twenty telephone numbers.

There is also provided in accordance with a preferred embodiment of the invention, a method of creating a telephone book, comprising:

automatically detecting a plurality of telephone numbers for a plurality of telephone calls, including both incoming and outgoing calls for at least one telephone number, by a telephone interchange through which said calls are routed;

a user selecting which of said numbers to store; and

generating a database including said numbers. Preferably, the method comprises generating a telephone book containing only those selected numbers. Preferably, the method comprises printing said book. Preferably, said numbers are associated with information and printing said book comprises printing a book including said numbers and said information.

There is also provided in accordance with a preferred embodiment of the invention, a method of interactive voice response, comprising:

vocalizing a menu during a telephone connection;

transmitting non-voice data associated with said menu during said telephone connection, to an initiator of said telephone conversation; and

receiving an input from a user indicating a choice responsive to said transmitted data. Preferably, said vocalized menu and said data are multiplex on a single telephone connection. Preferably, said data is transmitted in burst mode.

There is also provided in accordance with a preferred embodiment of the invention, a method of information search comprising:

providing an externally maintained database of telephone numbers;

providing a personal database of telephone numbers;

providing a search criteria; and

matching the search criteria against the two databases to generate a single list of search results. Preferably, the externally maintained database is locally stored. Alternatively, the externally maintained database is remotely stored. Alternatively or additionally, the personal database is stored at a remote location from where the search criteria is provided. Alternatively, the personal database is locally stored.

In a preferred embodiment of the invention, the external database is at least 100 times as large as the personal database. Alternatively or additionally, said personal database comprises a plurality of personal databases. Preferably, at least two of said plurality of personal databases are stored at different locations from each other.

In a preferred embodiment of the invention, said externally maintained database comprises a plurality of databases. Preferably, at least two of said plurality of externally maintained databases are stored at different locations from each other. Alternatively or additionally, matching comprises matching first against records in a cache. Preferably, said cache comprises telephone numbers for a particular geographical location. Alternatively or additionally, said cache comprises recently used telephone numbers. Alternatively or additionally, said cache comprises frequently used numbers.

In a preferred embodiment of the invention, said matching is limited to a certain geographical location. Alternatively or additionally, the method comprises ordering said list of search results. Preferably, said ordering comprises ordering by frequency of connection with said numbers. Alternatively or additionally, said ordering comprises ordering by a geographical criteria.

There is also provided in accordance with a preferred embodiment of the invention, a dedicated information system consisting essentially of:

a mass storage device comprising a database of telephone numbers;

an input means for entering search criteria; and

a central processing unit, which performs searches on said telephone numbers; and

an output means for displaying results of said searches,

wherein said mass storage device is directly connected, without a bus, to said central processing unit.

There is also provided in accordance with a preferred embodiment of the invention, a dedicated information system, comprising:

a memory comprising a first database of telephone numbers;

a removable mass-storage media comprising a second database of telephone numbers;

an input for entering search criteria, for searching said databases; and

a display for displaying search results,

wherein, said system requires no prelude input to enter search criteria. Preferably, said system includes a cache comprising a database of geographically related telephone numbers.

There is also provided in accordance with a preferred embodiment of the invention, a method of delivery tracking, comprising:

detecting an incoming telephone number on an incoming call, which telephone number is provided by carrier wave;

retrieving a record of information associated with said telephone number;

printing said associated information unto a printable substrate; and

attaching said printable substrate to an object who delivery is required. Preferably, the method comprises delivering said object, responsive to said associated information printed on said attached printable substrate. Alternatively or additionally, said information is stored in an externally maintained database. Alternatively or additionally, said information is stored in a personal database.

There is also provided in accordance with a preferred embodiment of the invention, an information system, comprising:

a mass storage device, comprising an externally maintained database;

a memory comprising a personal database;

a docking station for connecting electronic organizers to the system; and

a processing unit which downloads information from said databases to said docking station, to update an organizer. Preferably, said docking station comprises a network connection and wherein a plurality of organizers are connected to said network.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more clearly understood from the following detailed description of the preferred embodiments of the invention and from the attached drawings, in which:

Fig. 1 is a schematic block diagram of a dedicated information system in accordance with a preferred embodiment of the invention;

Fig. 2 is a schematic block diagram showing the connection between a dedicated information system and outside devices, in accordance with some preferred embodiments of the invention;

Fig. 3 is a schematic block diagram of a configuration in which a personal database is located at a telephone service provider; and

Fig. 4 is a flowchart of a method of generating personal database information from CDRs.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 is a schematic block diagram of a dedicated information system 10, in accordance with a preferred embodiment of the invention. System 10 preferably includes a mass storage unit 16, preferably a removable media, such as a CD-ROM, a DVD or a flash card. Storage unit 16 preferably has stored thereon a database including externally provided information, such as names, telephone numbers, addresses, e-mail addresses, WWW addresses and/or other personal information. The database is preferably organized in the form of records, each record associated with a particular individual. System 10 preferably also includes a memory unit 14, which has stored thereon a personalized database, typically several orders of magnitude smaller in size and/or number of entries than the external database. In a preferred embodiment of the invention, the personal database also comprises records similar to those of the external database.

In some preferred embodiments of the invention, especially where the mass-storage device is not removable, the personal database may also be stored thereon. Another typical difference between a personal database and a external database, besides their relative size, is that the personal database is at least partially maintained by the user, while the maintenance of the external database is not usually the responsibility of the user. In a preferred embodiment of the invention, records in either one or both of the databases may be grouped and/or indexed by affiliation, such as by belonging to a particular social circle or a corporation. An individual may belong to more than one affiliation.

In accordance with a preferred embodiment of the invention, system 10 includes a CPU 12 which performs searches for data entries in the databases. Preferably, a single search command performs the same search in both databases so that only a single set of search results is shown to a user. Preferably, the search results from both databases are shown together, however, in some preferred embodiments of the invention, the search results may be sorted in order of the database from which they originate and/or may be marked to indicate their origination. Preferably, each matched entry is assigned a hit value, which indicates its relative importance/match quality and/or relevance.

In accordance with a preferred embodiment of the invention, mass-storage unit 16 is controlled by a dedicated storage controller 18, which controller is directly connected to CPU

12, preferably without using a general purpose bus. A dedicated system driver on CPU 12 is preferably used to communicate with storage controller 18. The use of dedicated connections and/or drivers can enable the access to the mass storage device to be considerably faster. This allows for using less expensive parts and/or for providing a faster response time to a user.

In accordance with a preferred embodiment of the invention, the dedicated storage controller is a "smart" storage controller which accepts high-level commands, such as queries, from the CPU and transmits the results of the queries to the CPU. Alternatively, the controller is a low-level controller which accepts seek commands. Alternatively or additionally, the controller is connected to the CPU using input-output ports on the CPU.

In accordance with one preferred embodiment of the invention, the CPU comprises one or more ASICs (application specific integrated circuits), preferably programmable ASICs. Programming instructions are preferably stored in flash memory, in battery backed-up static RAM and/or using other method known in the art.

In accordance with a preferred embodiment of the invention, an entry may be made into the personal database by selecting a record in the external database. In addition to or instead of copying the entry from the external database to the personal database, a pointer to the record in the external database is stored in the personal database. In a preferred embodiment of the invention, when the information in the external database is changed, the information in the personal database is also changed. Preferably, the information in the personal database is automatically updated, since the pointer now points to updated information. Alternatively, especially when a copy of the external data is stored in the personal database, the user is asked whether to update the data. In a preferred embodiment of the invention, each entry in the external database is assigned a unique identifier, so that it is possible to match an old pointer to a new entry even if the name, address and/or telephone number of the entity associated with the entry have been changed.

In a preferred embodiment of the invention, the user can annotate information in the external database, such as to correct errors or add information. Preferably, this annotation is achieved by an entry in the personal database pointing to an entry in the external database.

In a preferred embodiment of the invention, system 10 includes a display 22 to display the search results and an input device 20 to enter search criteria and/or select different functions of system 10. Preferably, the display is a flat panel display, such as an LCD display. The input device is preferably a small alphanumeric keyboard. In a preferred embodiment of the invention, the display is touch sensitive so that a user can indicate a selection by touching the screen. Additionally or alternatively, the user may enter data by touching displayed

buttons. Alternatively or additionally, the display may recognize handwriting and/or a separate handwriting input may be provided. Alternatively or additionally, graphical annotations of records is possible. In a preferred embodiment of the invention, the display is used to display a geographical and/or a schematic map on which the results of a search may be indicated. Alternatively or additionally, a user may select a portion of a displayed map to indicate a geographical region to which the search should be limited. Alternatively, a user may enter such a geographical limitation by entering an allowed aerial distance, road distance and/or driving distance for a particular location and/or region. Alternatively or additionally, the dedicated information system may include a DTMF detector which can recognize telephone dialing of key-pad numbers.

In a preferred embodiment of the invention, the system is maintained in a standby-for-search mode. In this mode, any key (e.g., letter) entry is used to start a search and/or to further limit a search in progress. Preferably, the search is key-word based and any letter which is entered is appended to the previously entered data. In one example of a search, in accordance with a preferred embodiment of the invention, entering "A" will generate all those entries in which the given name and/or family name start with an "A". Preferably, the search results are displayed as soon as the data is entered, without waiting for a user to press a special "search" key. Entering a "D" will limit the displayed results to those which start with an "AD". Further entering "AM" will limit the search to those names which start "ADAM". Entering a space preferably indicates the start of a new keyword. When the user enters "EVE", the search results will be limited to those entries which contain the words "ADAM" and "EVE". Such entries may include "Adam and Eve, Garden of Eden, Earth 555-1212" and also "Eve Smith, 5 Adam Blvd., Anyville 555-2121". Preferably, the user may also enter modifiers which can be used, for example, to require all the words to appear (AND), to allow any one of the words to appear (OR), to force an order on the search results, to allow wildcards or to force a match to a particular field of the data record. Preferably, a "clear" button and a "backspace" button are also provided, so that a user can clear a search and/or erase a previously entered letter. Alternatively or additionally, one or more buttons is provided for choosing which databases take part in the search.

In accordance with a preferred embodiment of the invention, words (for the search) can be entered in any order. Preferably, in the results, the entered text and the corrected and/or completed text are displayed using different colors. In a preferred embodiment of the invention, the search can also include numbers, such as telephone numbers and/or any information which is stored in the personal database. In one example, a search may be

performed and/or the search results ordered based on the last time a particular individual was called-up or called in. It should be appreciated that a single individual may have more than one telephone number. Preferably, different records that are associated with a single individual are linked together. Preferably, the personal database stores communication statistics including not only which telephone number was called but also the aggregate number of times a particular individual was called, using any of his telephone numbers.

In accordance with a preferred embodiment of the invention, the system parses the entered query. Preferably, the system supports natural language entry. Alternatively or additionally, the system matches each part of the entry to one or more templates of address formats, so that the meaning of each part of the entered data is clear.

Preferably, the search results are stored in a search cache and/or entered into the personal database. In the case of many found records, preferably only the first few records are stored in the personal database. Alternatively or additionally, search results are stored only if there is a small number of them and/or if they were actually used for calling. In a preferred embodiment of the invention, once a record is automatically entered into the personal database, a user may annotate it at his leisure. Preferably, after a certain time has passed and the user has not provided any annotation, the user will be prompted to add annotation, keep the record and/or erase the record.

In accordance with a preferred embodiment of the invention, system 10 includes a speaker 24, which may be used to generate responses to user input. Alternatively or additionally, the speaker may be used to read out certain selected entries and/or to provide interactive help in operating the system. Other possible uses of the speaker are described below.

In accordance with a preferred embodiment of the invention system 10 includes a microphone 26. Preferably, the microphone is used to enter voice annotations. Alternatively or additionally, the microphone may be used to enter voice commands. Alternatively or additionally, the natural language queries are entered using a voice mechanism. It should be appreciated that the voice recognition in some preferred embodiments of the invention may greatly facilitated by two factors: (a) the subject (and/or the syntax) is limited; and (b) most voice inputs should correspond to entries in one of the databases. In a preferred embodiment of the invention, any voice input is repeated back to the user, so he can assess whether the system understood him. Alternatively or additionally, the system will ask the user to repeat an input which is not clear. Preferably, the system provides feedback during pauses in the user data entry.

It should be appreciated that the directness of performing a search on system 10, in accordance with some preferred embodiments of the invention, may considerably increase the convenience of these embodiments. In one example, it allows a less than proficient user to operate the system without difficult. In another example, especially in conjunction with voice output features, it allows a blind, a vision-reduced or otherwise handicapped individual to perform searches, which that individual would find very difficult to perform using a standard telephone book. Further, in some preferred embodiments of the invention, once the entry is found, it can be read out to the user and/or the user can ask system 10 to perform the dialing.

User independent speech recognition is a relatively mature (and cheap) technology when only a small number of speech patterns need to be matched. In order to perform a search, generally only a small number of speech sounds (the individual letters and a small number of control commands) need to be recognized. In addition, in some preferred embodiments of the invention, there are few if any states of machine operation which need to be reported to the user, since the system can be limited to remain in a search mode. Preferably, a switch is supplied to shift the system between search mode and other modes.

In accordance with a preferred embodiment of the invention, system 10 includes a dialer 15. Many operational situations of system 10 end with a telephone number being dialed. Dialer 15 preferably dials any required numbers. Some example situations include: dialing one or more numbers which came up at a search, returning a call based on a message, queue management and automatic downloading of information. Dialer 15 may include an analog dialer, an ISDN dialer and/or an acoustic dialer. Preferably, dialer 15 performs line analysis to determine when the line is free and when it is in use. Thus, system 10 can differentiate between key-pad dialing which is meant for dialing outside calls and dialing which is meant for data entry.

In accordance with a preferred embodiment of the invention, the device is battery operated. Alternatively or additionally, it uses line voltage. Alternatively or additionally, the device connects to a car lighter socket.

In accordance with a preferred embodiment of the invention, system 10 includes a modem 30, for connection to the telephone line. Alternatively or additionally, system 10 may include other output connectors 28. An advantage of using a modem for downloading information is that data rates can be very high. However, there are considerable disadvantages to using a modem. First, additional hardware is generally required. In addition, a modem requires that there be another modem at the other side of the line. Using carrier-wave based data transmission is often preferable, since carrier wave transmission requires only a

demodulator. In addition, there is no shortage of carrier wave transmission units in most telephone switching networks.

Fig. 2 is a schematic block diagram showing the connection between a dedicated information system 10 and various outside devices, in accordance with preferred embodiments of the invention.

In one preferred embodiment of the invention, system 10 is connected to a computer 40, via a data line. Preferably the data line is a serial connection, preferably RS-232, however, other standard connections, such as a Centronics parallel connection or an infra red connection, may be used. In one preferred embodiment of the invention, the connection is used to send data from system 10 to computer 40 and/or from computer 40 to system 10. Alternatively or additionally, the data connection is used for control of computer 40 and/or of system 10. Preferably, control of computer 40 by system 10 requires a memory resident program in the computer which monitors the serial data port. Data connections may be used for one or more of the following purposes:

(a) to allow system 10 to operate as an external data drive for computer 40 (or for a computer 42, described below);

(b) to allow system 10 to access data stored at computer 40, preferably using a special purpose program;

(c) to download information from computer 40 to system 10, especially information for a personal database, but also optionally for external databases and/or updates thereto and/or applications to be run by system 10. Preferably, such data arrives by mail on a computer readable media, or is downloaded from the Internet;

(d) to upload information from system 10 to computer 40, especially for backup purposes and/or for printing;

(e) to control various functions of computer 40, from system 10; and

(f) to allow system 10 to perform CTI functions for computer 40.

In a preferred embodiment of the invention, a single computer is connected to- and/or services- more than one information system 10. Thus, it is easier to standardize at least some aspects of the operation of multiple instances of system 10. This embodiment is especially useful in an office situation, where each user requires a personal information system with different information thereon, but there are some types of information which should be standardized. In such an embodiment, system 10 may also be used to communicate between workers. Preferably, system 10 may be used to emulate an office telephone, preferably with memories for various entries. Alternatively or additionally, a single computer is used as a

network to transfer data and/or paging calls and/or messages between personal information systems. In some preferred embodiments of the invention, the single computer may communicate with other computers which are attached to information systems. In one preferred embodiment of the invention, each telephone station includes two extension numbers, one which is used to dial up the telephone and one which is used to dial up an information system associated with the telephone.

In a preferred embodiment of the invention, where there is more than one system 10 in an office, at least some of the dedicated information systems have reduced features, for example, they contain no CD-ROM. Alternatively, different ones of the systems may contain different features, so that they complement each other. In a preferred embodiment of the invention, these reduced featured devices may be updated from the more complex devices. Preferably they are updated through a network. Alternatively or additionally, they may be updated using a docking station. In a preferred embodiment of the invention, a system 10 is used to update electronic organizers.

In a preferred embodiment of the invention, a system 10 may be programmable as an IVR (interactive voice response) system. In one preferred embodiment of the invention, system 10 provides voice directory services. Alternatively or additionally, it may be used to provide information on changes in telephone numbers. In a preferred embodiment of the invention in an office situation, a system 10 receives information via carrier wave and, using a DTMF generator, generates data for telephones connected to a private exchange, which cannot transmit carrier wave information.

In accordance with a preferred embodiment of the invention, system 10 may be connected to a computer 42, via a modem connection. Such a connection may be used for transmitting data, but it may also be used, in some preferred embodiments of the invention, to allow information system 10 to emulate an Internet connection and/or other types of on-line service providers. In a preferred embodiment of the invention, system 10 is accessed by computer 42 using standard remote access programs, such as WWW browsers and Telnet programs. Alternatively or additionally, such a connection may be used to emulate a connection between system 10 and a remote computer (described below).

In accordance with a preferred embodiment of the invention, system 10 is connected to a sound system 50. Preferably, system 10 is used to play music on sound system 50.

In accordance with a preferred embodiment of the invention, system 10 is connected to a telephone 44. Alternatively, system 10 may be connected to a telephone handset, with system 10 emulating a base of the telephone. Preferably, the telephone is used as a private means of

sound and speech communications between a user and system 10. Alternatively or additionally, the telephone may be controlled by system 10, such as to ring when system 10 requires a response from a user. Alternatively, such ringing may be performed using a speaker integral with system 10.

In accordance with a preferred embodiment of the invention, the speaker is used to perform the ringing function instead of the telephone. In a preferred embodiment of the invention, the speaker generates a plurality of different distinctive rings. Preferably, such distinctive rings may be used to differentiate between different people for whom the call is intended and/or for performing a paging function. In one preferred embodiment of the invention, speech sounds, for example a person's name, are used instead of a ring. In an office situation, the speech sounds may be directed to a particular extension and/or may be broadcast on a local acoustic paging system. In a preferred embodiment of the invention, different people for whom the call is intended are differentiated by information carried by the carrier wave (and sent by the call originator). Alternatively or additionally, a single system 10 may be connected to a plurality of incoming telephone lines and each line is associated with a particular person or persons. Alternatively or additionally, the person is identified using a distinctive ring feature, such as found in many digital telephone interchanges. Alternatively or additionally, persons may indicate to the system that they are expecting a call from a particular party, so when a call arrives from that party, it is routed to the indicating person. Alternatively or additionally, a remote system 10 may communicate to the local system 10 the name of the person for whom the call is intended.

In accordance with a preferred embodiment of the invention, system 10 is connected to a telephone line 46. Preferably, system 10 is used to dial-up numbers found using the search features. Additionally or alternatively, the telephone line connection may be used for various other functions, especially carrier wave functions, in which data is transmitted over telephone lines, either between rings, or without ringing at all.

In accordance with one preferred embodiment of the invention, system 10 receives over the telephone line an indication whether or not there are pending e-mail messages. Preferably, the number and/or existence of such messages is communicated using carrier wave transmission. If such messages are pending, an indicator light on system 10 is preferably illuminated. In one preferred embodiment of the invention, system 10 includes a plurality of indicators, each of which may be used to indicate that a call and/or information arrived from a particular telephone number. Alternatively or additionally, system 10 may download the e-mail messages and display them, a database record associated therewith and/or a portion

thereof or read them out using a text to speech device. Preferably, part or all of the e-mail message, and/or at least the address and/or the first line and/or subject thereof are downloaded by carrier wave. Alternatively or additionally, system 10 dials an e-mail provider to download the e-mail. Alternatively, system 10 may control a connected computer (preferably through a serial port, as described above) to download the messages. A text-to-speech device may be used in conjunction with a optical character recognition module to read out facsimiles, in accordance with a preferred embodiment of the invention. Reading out of faxes is especially useful for some handicapped people.

In a preferred embodiment of the invention, system 10 connects to a scanner, such as a pen scanner, such as used for simultaneous translation, to read in telephone numbers. Alternatively, telephone numbers and other personal information may be scanned if they are faxed in. Preferably, a user indicates to the system which part of the fax contains an information record. In one preferred embodiment of the invention, the selection, identification and/or recognition of the information is performed on a personal computer and only the resulting information is passed on to system 10 for storage and/or annotation.

In accordance with a preferred embodiment of the invention, system 10 is used in conjunction with a mobile telephone, for example in car. Voice interaction for determining a telephone number is especially useful in automotive situations, since a driver cannot afford to take his eyes off the road and/or his hands off the wheel.

In accordance with a preferred embodiment of the invention, system 10 may be attached to one or more peripheral devices. Such devices are preferably connected using a serial port, however, other connection types, especially wireless connections may be preferred in some situations.

In one preferred embodiment of the invention, system 10 may download small amounts of information to a display card which is convenient to carry around. Such a display card preferably comprises substantially only a display and between one and four buttons to scroll the display. In one embodiment of the invention, a daily schedule, including telephone numbers, will be downloaded to such a display card. The display is preferably an LCD display. In one preferred embodiment of the invention, the card includes no batteries and is light powered. Alternatively or additionally, the display is non-scrolling and uses an LCD which can remain in an excited state without the application of power. When the display card is attached to system 10 or to a docking station and information is downloaded, individual pixels of the display are made dark or bright. These pixels remain in the state to which they were set even when power is removed, owing to the type of LCD used.

In a preferred embodiment of the invention, system 10 may be used for delivery services, such as pizza delivery, by connecting a printer for stickers to system 10. When a person calls up, the system identifies his number using carrier wave information. The person's address is extracted from a personal (for a regular customer) or external (for a non-regular customer) database and printed on a sticker. The sticker may then be filled out with the details of the order and attached to the order for use of the delivery person. In one preferred embodiment of the invention, system 10 allows a user to annotate the sticker, for example with the order information. Alternatively, these abilities of system 10 are included in a suitably programmed personal computer. However, it should be appreciated that a system 10 is typically preferred over a personal computer due to its being dedicated and/or simple to operate and/or rugged.

In one preferred embodiment of the invention, system 10 may be connected to a business card scanner. Alternatively or additionally, it may be connected to a magnetic card reader. Alternatively or additionally, it may be connected to an interface for electronic money cards.

Thus, it should be appreciated that in various preferred embodiments of the invention, an input may be provided from one of many sources, including, but not limited to, a CD-ROM, a user input, a remote computer, a modem connection, an organizer, a telephone database, such as provided on-line by a telephone company, a remotely located dedicated information system, a remotely located personal database and/or a scanner.

In accordance with a preferred embodiment of the invention, system 10 includes a DTMF receiver which can detect when a telephone is used for pulse and/or tone dialing and can decipher the numbers which were dialed. Preferably, when a call is made, the number called is placed into the personal memory and/or the cache for later possible annotation by the user. Alternatively or additionally, a record associated with the telephone number is automatically displayed to the user, when the number is dialed. Preferably the record includes information on the statistics of telephone connections (rate, length, who initiated) between system 10 and the other number.

In a preferred embodiment of the invention, the DTMF receiver can detect numbers dialed from either side of the telephone conversation and possibly in the middle of the conversation.

In accordance with a preferred embodiment of the invention, system 10 may be used to transmit voice and data simultaneously. This situation may occur when a user calls up directory assistance. In one preferred embodiment of the invention, the number requested is

downloaded to system 10 before, during or after it is provided to the user. In one preferred embodiment of the invention, the telephone number information is frequency and/or time multiplexed with the voice communication. Preferably, the information includes a tag which identifies it as information. Alternatively or additionally, no synchronization is used and the signal is detected asynchronously. In one example, the information is transferred as a short electronic squeal either before or after the number is voiced to the user. Alternatively or additionally, simultaneous data/voice transmission protocols may be used, for example SVD and DSVD used for Rockwell compatible modems, or other protocols as known in the art. Alternatively or additionally, especially where the number is synthetically generated, system 10 speech-recognizes the number. Alternatively or additionally, each generated number includes a audio-encoded representation of the digits comprising the number. Alternatively or additionally, when a number is provided to the user, the user is asked if he wants to download the number and/or associated information, and may press a key to do so and/or may hang up if he does not desire so.

In a preferred embodiment of the invention, especially where the user immediately makes the telephone call, the directory service provides the information using carrier wave technology in an incoming call after the directory request. Such a call may be special or the information may be transmitted using the next incoming telephone call. Preferably, the ring used is special (an "OK" ring) so that a user will not pick up the telephone by mistake. More preferably, the dedicated information system does not sound the ring at all. Alternatively it generates a voice message. Alternatively to providing telephone numbers, other information may be requested and then downloaded to system 10 by carrier wave, for example the number of pending e-mail messages.

In a preferred embodiment of the invention, when a user calls a number, the telephone interchange detects the call and provides information relating to the telephone number called, for example an address, using a carrier wave on a next ring. This information is preferably stored in the personal database, possibly as an annotation to the external database. Preferably, the user may be required to pre-dial a special code to activate this feature, so that in most cases, the telephone company will not be required to provide the information, unless requested. Alternatively or additionally, a subscription to the service may be required.

Alternatively or additionally to transmitting information to a system 10, the information may be transmitted to a smart telephone, for example an AT&T model 882, which can be configured to automatically store any incoming telephone number which is provided by carrier wave.

In a preferred embodiment of the invention, when a user of a dedicated information system calls up an IVR service, the information system's display is used to supplement the IVR. Preferably, the display is used to display the information and/or menus voiced by the IVR. Alternatively, the display is used for supplemental information. In a preferred embodiment of the invention, the supplemental information and/or menus are already stored on the dedicated information system and the IVR only downloads codes for selecting what to display for a particular IVR. Alternatively or additionally, the data communications includes data for generating speech at the dedicated information system. In a preferred embodiment of the invention, the above described methods of multiplexing a voice and data communication are used for sending the visually displayed information.

In a preferred embodiment of the invention, data is transmitted in a burst mode, so that a carrier wave is not required for the entire duration of the connection. It should be appreciated that such menus are typically short and can preferably be transmitted in 0.25 seconds, so that only a minimum degradation in voice quality occurs. Alternatively, the bandwidths of the voice and data channels dynamically traded-off, since most of the time only voice will be transferred and only a portion of the time will data be transferred. Preferably, both the voice and the data are transferred as digital data packets and the trade-off is implemented by differential allocation of data packets between the channels. Preferably, the data portion for a menu is transmitted before the speech portion, so that a user can read the menu and make his selection before hearing all the menus read out.

In an alternative preferred embodiment of the invention, two telephone connections are used, one for voice and one for data. The two connections are preferably synchronized by using a common code number (preferably suggested by the IVR server) for communications. Alternatively, the information system initiates both calls. Alternatively one of the calls is a call-back from the IVR server.

In accordance with another preferred embodiment of the invention, system 10 is used for pager functions. In one preferred embodiment of the invention, when a person is paged, system 10 is notified, preferably using a carrier wave indication. The carrier wave may also be used to transmit a text of the page. Preferably, system 10 activates a special sound signal, so that a user knows that he received a page. Preferably, the user can listen to a readout of the page over a handset. Alternatively or additionally, the text is displayed on display 22.

In accordance with a preferred embodiment of the invention, carrier wave technology is used for caller identification. Preferably, such callers are compared against a blacklist. If there is a match, such a caller may receive a message that his call is not wanted. Alternatively or

additionally, the external and/or personal databases are annotated to indicate the number and/or timing of incoming calls. Additionally or alternatively, when an incoming call arrives, the entire (annotated) entry is displayed.

In accordance with a preferred embodiment of the invention, system 10 is used to transmit voice and/or text messages to another user. A voice message is recorded on system 10. System 10 calls up the recipient and either reads out the message, at a time and date requested or transmits it to a similar system 10, preferably using carrier wave technology, to be readout by the other system 10. Alternatively, the message may be transmitted as an attachment to an e-mail message.

In a preferred embodiment of the invention, when a first system 10 communicates with a second system 10, the call includes carrier wave information which tells the second system 10 to pick up immediately and/or to expect data communications. Thus, a dedicated telephone line is not needed for such communication and/or the user is not bothered. Alternatively, such a carrier wave indication may be used to pre-select between calling a voice, fax and/or data connection at a single number. Alternatively, it may be used for general data communications between two computers.

In accordance with a preferred embodiment of the invention, information system 10 may be connected by modem to a remote computer 48 (which can be the same as computer 42). In accordance with one preferred embodiment of the invention, such a connection is initiated by system 10. Alternatively or additionally, such a connection is initiated by the remote computer. Such a connection may be used for one or more of:

(a) downloading new applications and/or software updates to system 10;

(b) downloading updates to databases at system 10;

(c) perform a search on a remote database, when the information in a local database is incomplete or not up to date and/or if a fast responding connection is available;

(d) automated remote diagnosis and maintenance of system 10; and

(e) uploading usage and/or searching and/or telephone usage statistics, from system 10, such statistics preferably including outgoing and/or incoming telephone numbers, length of telephone conversations and/or searches, and/or temporal distribution thereof.

In some preferred embodiment of the invention, the external database may be stored at the remote computer. Alternatively or additionally, the personal database may also be stored at the same or a different remote computer. It should be appreciated that a personal database may still be maintained locally, by the user, even if a considerable portion of the data transfer between databases is at a remote location.

In a preferred embodiment of the invention, downloading information from a remote computer requires a password. Alternatively or additionally, each such connection is charged to the user.

In a preferred embodiment of the invention, when a database is updated, only part of the database is updated, for example only the personal entries, only the annotated entries, only the entries which are listed under certain subjects, only the entries for subjects which had been searched and/or entries which meet certain geographical restrictions. It should be appreciated that in a mobile telephone embodiment, a user might frequently change his location or travel between a small number of geographical locations.

In a preferred embodiment of the invention where an information system does not include a local copy of the external database, the system preferably downloads telephone numbers associated with a local geographical region. The location of the system is preferably automatically ascertained using GPS, calling up the telephone service provider and/or by a service provided by a cellular telephone interchange.

In accordance with a preferred embodiment of the invention, system 10 includes a cache that is searched first. Thus, the first few search results are usually entries from the cache. Preferably, an entry is placed and/or maintained in the cache, responsive to the frequency and length of telephone calls to an entity associated with the entry, the frequency and length of incoming calls from the entity and/or the geographical location of the entity.

In accordance with a preferred embodiment of the invention, system 10 performs queue management functions. Preferably, when a user performs a search he can select one or more records to be queued. Preferably, the system calls up the entries in sequence or based on any order desired by the user. Preferably, when a call is made, the system allows a user to add annotations to the entry, including general annotations, such as blacklisting and trustworthiness and also specific annotations, for a particular search, such as the price wanted. Preferably, blacklisting an entry will reduce the quality of its match, so that in future searches there is a lesser or null probability of the entry appearing.

In accordance with another preferred embodiment of the invention, system 10 may be used to maintain a database for appliance management. Preferably, when a user buys an appliance, a service and/or any type of product, a CD-ROM is attached. When the user inserts the CD-ROM into information system 10, personal entries corresponding to service and/or repair and/or helpdesk telephone numbers are created and/or updated. Alternatively or additionally, a user manual is also uploaded to the system, so that a user can browse and search the manual using system 10. Alternatively, the user manual is stored on the CD-ROM, so that

an existing external database must be removed in order to browse the manual. Preferably, the CD-ROM also includes application software for trouble-shooting the appliance or for other uses associated with the appliance and/or for advertising purposes, such as a catalog. Alternatively or additionally, a unique product identifier may be uploaded, so that it is handy when a repair service is called up. Preferably, when a service is performed, system 10 is updated with the details of the repair and/or the status of the device. In a preferred embodiment of the invention, a product maintenance file is downloaded to system 10, before and/or after the repair. Alternatively, the technician updates system 10 directly and the information is uploaded to the service provider.

In a preferred embodiment of the invention suitable for services, the CD-ROM may include a catalog, which is preferably displayed and activated when the service provider is called. System 10 may also automatically transmit an order to the service provider.

In accordance with a preferred embodiment of the invention, such data may be entered using a bar-code reader and/or a magnetic card and/or from a computer connected to system 10. Preferably, limited storage media, such as bar codes, are used to select entries which already exist in the external database, rather than for adding new entries. In one preferred embodiment of the invention, bar codes are read using a pen scanner which is attached to system 10.

In accordance with a preferred embodiment of the invention, an appliance-related CD-ROM may also be used to automatically update a computer. Preferably, when the CD-ROM (or other computer media) is inserted into the computer, various files are automatically updated and/or copied to the computer. Preferably, software on the CD-ROM and/or on the computer automatically detect which telephone list management software is used on that computer and updates that software with new entries. Additionally or alternatively, manuals are copied to the system, for example in Adobe Acrobat® format. Additionally or alternatively, the user installs a single appliance management program, preferably from the CD, on his computer, which program can be used for listing the relevant telephone numbers and/or for browsing manuals.

In accordance with a preferred embodiment of the invention, a voice mail system stored at a telephone company is managed using a dedicated device. This dedicated device may comprise a dedicated information system as described herein. Alternatively, it may be a device dedicated only for voice messages. In a preferred embodiment of the invention, the voice messages (and/or optionally e-mail messages) are stored at the telephone company and only a list of the calls is displayed locally. A user can browse the list and select a call to hear,

at which point the message may be downloaded and/or sounded live by the telephone company. Alternatively, the operation of the dedicated device is like an answering machine, except that the messages are stored at the telephone company. In a preferred embodiment of the invention, the telephone company sends, by carrier wave, an indication of who called and left a message. This indication may be used to display the list. Preferably, the list includes name, telephone number, time called and/or duration. Preferably, e-mail messages are displayed in a similar manner, preferably including a telephone number, as described herein. Preferably, the subject line of the e-mail message is also displayed.

In accordance with a preferred embodiment of the invention, the personal database is stored at a remote location from system 10. Optionally, system 10 may include a second personal database. Fig. 3 is a schematic block diagram of a configuration 100 in which a personal database 106 of a user 102 is located at a telephone service provider 104. In a preferred embodiment of the invention, the personal database is stored at a telephone company which provides service to at least one telephone line with which the personal database is associated. Preferably, the personal database is stored at a local telephone exchange central office, alternatively, it may be stored at a more central location, depending on the configuration of the telephone system. As used herein, the term "telephone company" is used to indicate such locations. Alternatively, the personal database may be stored in a private telephone exchange. Preferably, however, the personal database is stored in association with hardware and software which provides other telephony services, so that the integration between the personal database and telephony services is easier. In a preferred embodiment of the invention, the personal database may be accessed using a standard telephone. This has the advantage that the personal database can be accessed from any location, including using a cellular telephone and a radio-telephone. However, as can be appreciated, the display of system 10 (Fig. 1) does increase the ease of use of the personal database. Alternatively or additionally, when using a cellular telephone, the display of the cellular telephone may be used to display information from the personal database and/or to aid in operating the personal database's functionality.

In a preferred embodiment of the invention, the location of the personal database at the telephone company is used to assist in performing other telephony services. In one example, a user can request a conference call by indicating particular ones of the entries in the personal database. In another example, a user can request the telephone company connect him with one of the entries in the database, either as a result of a search or by indicating the entry directly. In

yet another example, a user can have the telephone company perform queue management and/or call up entries which are a result of a search on the personal database.

In a preferred embodiment of the invention, a user 102 can send requests to telephone company 104 via a computer data connections, such as via an Internet 108, using an interactive connection, such as a WWW browser or a non-interactive method such as e-mail. In a WWW example, a user can perform searches on personal database 106 and/or external databases, one or both preferably maintained at telephone company 104. A user can then indicate to the telephone company selected ones of the search results (e.g., users 110 and 110') to connect (the user's telephone) to, sequentially or in parallel (conferencing). Preferably, a user define to company 104 what action to perform in the situations where a call cannot be completed, for example, "no-answer" or "busy". Alternatively or additionally, such a WWW connection can be used to display incoming call information to a user, when his telephone rings, or responsive to a request by the user while the telephone line is live or shortly thereafter. Alternatively to incoming call information, other information, for example stock quote, bank transaction information (feedback to telephone requests) or weather information may be provided. Thus, a user can be identified based on the calling location and/or information transmitted over the relatively secure medium of telephone lines, rather than using insecure Internet connections.

In another example, a user can review e-mail and/or voice mail messages based on personal information displayed with them. Preferably, the user can browse his messages in a non-sequential order. In one example, a user can define an order of priority of message sources, for instance listening to family messages first. In another example, a user can request messages from a particular caller. Alternatively or additionally, a user can reply to a message from the mailbox. Alternatively or additionally, a user can enter a number directly from the mailbox into his personal database. Preferably, the personal databases associates e-mail addresses with telephone numbers. Preferably this association can be used to reply by phone to e-mail messages and vice-versa. Alternatively or additionally, a user can send e-mail using a voice to speech mechanism and/or as a sound file attachment to an e-mail. Preferably, such an e-mail reply can be read out by its recipient, if a telephone number is associated with the e-mail address and the recipient so desires.

In a preferred embodiment of the invention where a standard telephone is used as the user interface, a user preferably enters textual data using key-pad letter codes. Alternatively, a set of user voice templates are stored at the telephone company and used for voice recognition. Preferably, such voice recognition is limited to a small number of letters, phonemes, commands and/or words. Alternatively or additionally, such a personal database is accessed

using an ADSI compliant telephone. In a preferred embodiment of the invention, a telephone is provided to customers with preprogrammed keys being preprogrammed with key-presses which perform functions of accessing the personal database. Alternatively, especially for ADSI telephones, the programming of the keys may be downloaded from the telephone company and/or from a different remote service provider.

In a preferred embodiment of the invention, a user can order reports from the telephone company, including, usage, update frequency, recent changes, mismatches between the personal database and the telephone company database, and, especially, a personal telephone book. Such reports are preferably ordered using a dedicated information system. Alternatively they may be ordered by telephone, preferably using an IVR system. Alternatively, such reports may be generated by the dedicated information system and sent to a computer to be printed. The computer may be a local computer or a remote computer, to which the data is sent by remote communication.

In a preferred embodiment of the invention, the personal database can be updated by one of many methods. Such updating can include adding, removing and/or changing data records. One method of updating is automatic updating, made simpler since the personal database is more conveniently located to the data provider (the telephone company). Thus, when a user calls up a voice information service, calls up a number and/or is called up, the telephone company can automatically transfer the determined telephone number-associated information to his personal database.

Alternatively or additionally, a user updates the personal database by sending e-mail, which can also include commands to changes the contents of the database. Alternatively or additionally, such modifications may be affected using a Web interface. Alternatively or additionally, a user can send a data-file. Such a data-file may contain complete entries or it may contain partial entries to update what is entered or to be filled out from the telephone company database. Alternatively or additionally a mechanism of business card transmission is provided in which a user can transmit a business card to another person's personal database. Alternatively or additionally, such information can be entered during a conversation, by either of the participants of the conversation. In a preferred embodiment of the invention, entered information is associated with the correct entry in the personal database using a display at one of the participants. Alternatively or additionally, a voice annotation is attached to the numeric input.

In a preferred embodiment of the invention, a user updates a personal database by calling up the telephone company and providing a number to add and/or entries to delete or entries to change. Preferably, these updates are performed using an IVR server.

In a preferred embodiment of the invention, the telephone company automatically provides shortened dial codes for numbers in the personal database. Preferably, these shortened codes are selected to be mnemonic. Alternatively, they may be filled in sequentially. Alternatively, the number to be used may be suggested by a user. Preferably, some of the shortened dial codes are reserved for being set by the user. In some cases, the telephone company adds shortened dial codes responsive to a user asking for the number to have a shortened dial code associated with it. Alternatively, the shortened dial code is provided automatically when the number is added to a personal database and/or if it meats certain criteria.

In a preferred embodiment of the invention, a database or significant portion thereof can be transmitted from one user to another, for example, an alumni database. In a preferred embodiment of the invention, people who are always moving between telephones update their and/or others' personal databases with their current telephone number and/or a telephone itinerary, so that they can be easily found. Preferably, once such an itinerary is associated with a particular person, that person can call up and change the itinerary, preferably by advancing and/or delaying it.

In a preferred embodiment of the invention, the above mechanisms for updating a personal database may also be used to perform queries on it and/or to download information from it.

In a preferred embodiment of the invention, each telephone number has associated therewith one personal database. Alternatively, more than one database may be associated with a single number. Alternatively or additionally, more than one telephone number is associated with a single personal database. In a preferred embodiment of the invention, a plurality of personal databases may be associated with a plurality of telephone numbers, for example in an office setting. Preferably, a user can access a particular personal database by dialing a special code associated with the user or the database.

In a preferred embodiment of the invention, database transfer services are utilized to update a cellular telephone. Many cellular telephones contain a large number of memories, however, data entry is difficult. In a preferred embodiment of the invention, an entire personal database or individual records therefrom may be downloaded into a cellular telephone by the cellular operator. Preferably, the download operation takes into account the type of telephone.

It should be appreciated that many embodiments described herein for use with a dedicated information system may be implemented by suitably programming a cellular telephone. However, instead of using carrier wave technology to transfer information, a cellular data transfer protocol is used instead. In an alternative preferred embodiment of the invention, the dedicated information system is emulated by the cellular operator, however, the personal database is stored at the cellular telephone and is read and updated directly by the cellular operator.

It should be appreciated that, in the telephone company, a plurality of databases may be stored as a single database, with each personal database comprising a view of the aggregate database.

It should be appreciated that many methods of providing numbers and associated information to a personal database, both at a telephone company and at a local dedicated information system, are described herein, including, DTMF receiving, capturing key-strokes, caller ID, modem link, direct connection from a telephone company, multiplexed data and voice and user entry. Generally, what is entered is a telephone number and the number is matched to information from an external database and is then stored, preferably in association with the information, in a personal database. In a preferred embodiment of the invention, the information is not automatically stored. Rather, some sort of filtering is applied. Such filtering may be automatic, such as by blacklisting certain numbers, geographical areas, or even commercial association. Alternatively or additionally, such filtering may be manual, such as requiring a user to request the number be stored and/or to OK the storage after the number is matched and the information is displayed. Preferably, the user is only prompted if the number is not already in the database.

As can be appreciated, the processes of receiving the number and/or the information and/or performing the matching may be expensive. Preferably, a user must request that these processes be performed, for example, by dialing a special code. User input which decides whether to add a number to the database and/or whether to perform matching and/or to receive the number and/or the information, may be termed "add-to-list" commands, since they instruct the telephone company or the personal information system whether to add telephone numbers to the personal database.

In one example of a telephone database creation system, the personal database and/or the required raw data are acquired by a telephone company and then downloaded to a user device. Thus, the user determines which of the raw data is to be included in the personal database. In other examples, at least part of the decision making is by the telephone company

or a third party. In a preferred embodiment of the invention, the user device comprises a dedicated information system, an organizer or a PDA. Alternatively or additionally, the user device may include other electronic, displaying, devices, in particular a personal computer. Preferably, the downloaded data and/or a database, created from the data, match a standard file format, for example as recognized by Lotus Notes® or by Microsoft Outlook®. The downloading may use any of the above described data transfer methods, however, in a preferred embodiment of the invention, data is transferred by e-mail. The e-mail may be sent automatically by the data provider. Alternatively or additionally, the e-mail is requested by a user.

In a preferred embodiment of the invention, the data originates from CDRs (call data records), which are typically stored by a telephone company for every outgoing call. Incoming calls are preferably identified using "caller ID" information which is associated with many calls or by analyzing the CDRs of other callers, to detect calls to the telephone number associated with the user whose calling patterns are being analyzed. In a preferred embodiment of the invention, the CDRs may be analyzed to determine a relative importance of callers, for example by analyzing the cost of a telephone call, rather than only its length.

Fig. 4 is a flowchart of a method of generating personal database information from CDRs. In an exemplary embodiment, the following process is used:

(a) relevant CDRs are obtained (120);

(b) the CDRs are filtered (122);

(c) new numbers and/or relevant data are extracted from the CDRs (124);

(d) additional data (such as names) is associated with the extracted numbers/data to form a database update (126);

(e) optionally, the database update is filtered to remove unneeded data or numbers, for example responsive to the additional data (128);

(f) optionally, a database at the telephone company is updated with the database update (130);

(g) the update is transmitted to the user device (132); and

(h) a local database is updated using suitable software at the user device (134).

In the above description, various of these steps may be initiated and/or performed by the user device, the telephone company and/or a third party (optional). The location of the action may determine the transmission of the data. For example, step (g) may be performed before step (d), if the filtering and/or adding of data is performed by the user device.

In the example of a third party, the third party preferably receives from the telephone company raw CDRs, possibly in response to a list of client telephone numbers for which to provide the data. The third party may collate the data from a plurality of sources, for example local telephone companies, long distance telephone companies, calling card companies and cellular telephone companies. In addition, data from a plurality of telephone lines maintained at each of these sources may also be collated. The third party then filters the data, for example to remove duplicates and/or select only particular fields, for example, hour, date, telephone number, record frame and client frame. In a preferred embodiment of the invention, the CDRs are marked so that relevant ones can be easily identified. The marking make be performed before, during or after the call which generates the CDR, for example by dialing a special code (e.g., "*45"), before after or during the call (also described as "Add to List", above). Alternatively or additionally, the CDR may be marked after the fact by analyzing the CDRs, for example for call frequency. Alternatively or additionally, a "fake" CDR may be generated (and marked) in response to a caller identification. Alternatively or additionally, the third party or the user device can transmit a query request to the telephone company, which responds by searching other users CDRs for calls which are directed to the particular user for whom a telephone book is being created.

In a preferred embodiment of the invention, a CDR is marked by modifying an existing field thereof, for example, by adding an extra digit or symbol to a telephone number field, obviously modifying the date (e.g., 1999->2099) or by entering symbols in an existing "extend" field. In some cases, only a single symbol can be added. Preferably however, a plurality of symbols are added, for example two or three digits, to better differentiate between different types of marking of a CDR.

Alternatively or additionally to marking an existing field, a CDR may be marked by adding another field thereto.

Information may then be extracted from the data, for example call frequency and patterns of numbers called (e.g. numbers which are always proximate in time). This information may be further filtered to remove numbers which are not of interest (e.g., information, 911) or to remove numbers which had already been sent to the user, in previous updates. Alternatively or additionally, the information is filtered to select only a subset thereof, for example based on geographical association, based on affiliation (e.g., a plurality of numbers in an institute) and/or based on those most commonly or recently used. Possibly, "new" numbers are identified by them not appearing in a local (at the telephone company or third party) database. Alternatively or additionally, some update records may depend on

analysis of previous data. For example, a new number may be defined to enter an update only if it is used at least twice. Thus, some updates may be delayed. In general, various scoring, composite scoring and/or other data processing techniques may be used to select the numbers to be used in building the directory, in accordance with preferred embodiments of the invention.

Additional information, for example names and addresses, may be associated with the data, to complete a database update file.

This file is then preferably transmitted to the user. The user may have software which received the update and automatically integrates it into local (at the user) databases. Alternatively, the user may interactively view the new records and decide which ones to add, remove, sort, edit and/or print. Preferably, the user software includes tools for managing a plurality of updates. In some cases, the database update comprises a complete database to replace an existing one. Possibly, the data is transmitted in a printer-ready format, to be conveniently printed by an end user. Alternatively or additionally, the user software sorts, filters and/or formats the data for particular types of directory formats, for example for a keeping in a purse, a pocket or a desk.

Once the user completes his editing activities, the final database and/or an update may be sent to the third party and/or the telephone company to update their databases, which they maintain locally for the user.

In some embodiments of the invention, the CDRs may be transmitted directly from a telephone company to the user. The user may process the CDRs or transmit them to a third party to be analyzed. Additionally, the third party may also utilize data from a user's PBX, which is preferably also forwarded by the user or downloaded by, for example by a direct dial-up, from the PBX to the third party.

In a preferred embodiment of the invention, CDR data at a telephone company may be associated with a particular extension number of a PBX by matching the PBX local CDR records against the telephone company records. The matching may be performed at the telephone company, the PBX, a user device or at a third party to which the data is downloaded. One result of such matching is that a user can maintain, at the telephone company, a personal business database which he can use from his home or mobile telephone (or possibly from a different telephone). Alternatively, if the personal database is stored at the user's PBX, the user can access the PBX from a remote location as a personal database provider, described herein. Such access can be direct or by the telephone company performing the access transparently to the user.

In another embodiment, raw or partially analyzed data is transmitted to a user's computer from the telephone company. This data may be processed with the aid of a third party, for example by downloading information from the third party or by uploading the data to the third party to be further analyzed. Alternatively or additionally, the data may be locally analyzed. Alternatively or additionally, the third party may store a more complete telephone listing than is available at the user.

The above embodiments have generally been described as using two databases, a personal one and an external one. However, it should be appreciated that some preferred embodiments of the invention may be practiced with more than two databases and/or more than one mass-storage device. In one preferred embodiment of the invention, the databases are arranged in a hierarchical manner, e.g., a personal database, a workgroup database, a company database and an external database. Alternatively or additionally, the databases may include multiple external databases, for example, for different subjects and/or for different telephone area codes and/or for different price levels. Alternatively or additionally, multiple personal databases may be searched, for example, if a system 10 is used by multiple users and/or for multiple activities, such as work and leisure. Preferably, when more than two databases are available, a user may select which ones of the databases to search. Preferably, when more than one user uses a same system 10, a different configuration setup is maintained for each user and/or usage.

In a preferred embodiment of the invention, the data provider personalizes the external database to match the user profile. Preferably, such personalization includes modifying the promotional material and not including some subjects and/or telephone numbers.

In accordance with a preferred embodiment of the invention, system 10 may be used for additional applications, including, a CD Walkman, a personal organizer, an answering machine and/or a home telephone interchange. Preferably, when the system operates as an answering machine and/or as a telephone interchange, it stores statistics related to incoming and outgoing calls.

It should be appreciated that the above described apparatus and methods for personal information management contain many features, not all of which need be practiced in all embodiments of the invention. Rather, various embodiments of the invention will utilize only some of the above described techniques, features or methods and or combinations thereof. In addition, although typically complete systems and/or methods have been described, the scope of the invention is intended to include sub-components and/or sub-methods, for example, an ASIC around which a dedicated information system is built. In addition, it is appreciated that

some preferred embodiments of the invention exist mainly as software components, for example for operating as part of a telephone interchange and/or providing remote personal database services. In addition, although some of the above embodiments have been described solely as apparatus or as methods, the scope of the invention includes apparatus for carrying out the methods and methods of using the apparatus. Further, the scope of the invention includes computer-readable media on which software suitable for carrying out various embodiments of the invention is stored. When used in the following claims, the terms "comprises", "comprising", "includes", "including" or the like mean "including but not limited to".

It will be appreciated by a person skilled in the art that the present invention is not limited by what has thus far been described. Rather, the present invention is limited only by the claims which follow.

CLAIMS

1. A method of telephone number entry, comprising:

dialing a telephone number on a telephone line, to make a telephone connection;

automatically detecting and storing said telephone number by an information system, in a personal database which detecting and storing is controllable by a person who performs said dialing; and

associating the telephone number with information relating to the telephone number, for said storage which information exists in an external database.

2. A method according to claim 1, wherein said information system eavesdrops on said telephone line.

3. A method according to claim 1, wherein said call is placed through said information system.

4. A method according to claim 1, wherein said storing comprises storing additional information in association with said telephone number.

5. A method according to claim 1, wherein said information system is integrated with a telephone company through which the call is routed.

6. A method according to claim 1, wherein said information system is a stand-alone device.

7. A method according to claim 1, wherein said external database is integrated with a telephone company through which the call is routed and comprising requesting said information from the telephone company by said information system.

8. A method according to claim 7, wherein said information is transferred by carrier wave.

9. A method according to claim 7, comprising matching said telephone number to said personal database and requesting said information only if said match fails.

10. A method according to claim 7, comprising prompting a user whether to request said information and requesting said information responsive to said user's response to said prompt.

11. A method according to claim 7, wherein said telephone company sends said information only if a user pre-dials a data-request code.

12. A method according to claim 1, wherein said dialing is detected by a DTMF receiver.

13. A method according to claim 12, wherein said dialing is performed while the telephone line is active.

14. A method according to claim 13, wherein said dialing is performed by the initiator of the call for which the line is active.

15. A method according to claim 13, wherein said dialing is performed by the receiver of the call for which the line is active.

16. A method of telephone number entry, comprising:

dialing in to a telephone line to make a telephone connection, wherein the originating telephone number is provided by a carrier wave;

automatically detecting and storing said telephone number, in a personal database, by an information system which eavesdrops on the telephone line, which detecting and storing is controllable by a person who performs said dialing; and

associating the telephone number with information relating to the telephone number, for said storage which information exists in an external database.

17. A method of telephone number entry, comprising:

making a telephone connection, wherein one of the parties is a particular telephone line having a telephone number;

associating the telephone number with information relating to the telephone number; and

a telephone company automatically detecting and storing said telephone number and information associated with said telephone number, in a personal database associated with said telephone line, which detecting and storing is controllable by a person who is party to said call;

18. A method according to claim 1, comprising displaying said information, during said call.

19. A method according to claim 1, wherein said user controls said storing by setting storage logic options.

20. A method according to claim 19, wherein said user sets said storage options via an Internet.

21. A method according to claim 20, wherein said user sets said storage options via a WWW browser.

22. A method of telephone number entry, comprising:

dialing a directory information service to make a telephone connection, on a telephone line to determine a telephone number; and

automatically detecting and storing said telephone number, in a personal database, by an information system which eavesdrops on the telephone line,

wherein said directory service is a voice service which provides a voice output of the telephone number.

23. A method according to claim 22, wherein said information system comprises a speech recognizer.

24. A method according to claim 22, wherein said information system is integrated with said directory information service and wherein said storing is at said information system.

25. A method according to claim 22, wherein said directory information service mixes computer understandable information with said voice output.

26. A method according to claim 25, wherein said computer information is transferred in a burst mode, without a carrier wave.

27. A method according to claim 25, wherein said computer understandable information is provided after the voice output.

28. A method according to claim 25, wherein said computer understandable information is provided before the voice output.

29. A method according to claim 22, wherein said telephone number is provided by carrier wave after said dialing.

30. A method according to claim 29, wherein said telephone number is provided by carrier wave after said dialing only if requested by a user.

31. A method according to any of claims 1-30, wherein said automatically detecting and storing comprises matching said number against said personal database and storing said number only if said number is not in said database.

32. A method according to any of claims 1-30, wherein said automatically detecting and storing comprises prompting a user if to store said number and storing said number responsive to said prompt.

33. A method according to any of claims 1-30, wherein said automatically detecting and storing comprises storing said number only if a user dialed a special store-request code.

34. A method according to any of claims 1-30, wherein storing comprises:
matching said number with information;
displaying said number and said information to a user; and
storing said number responsive to the user's response.

35. A method according to claim 34, wherein said storing said number comprises storing said matched information.

36. A method according to any of claims 1-30, wherein said automatically detecting and storing comprises storing only a single copy of said number.

37. A method according to any of claims 1-30, wherein automatically detecting and storing comprises storing during said telephone connection.

38. A method according to any of claims 1-30, wherein automatically detecting and storing comprises storing after said telephone connection.

39. A method according to claim 38, wherein automatically detecting and storing comprises analyzing CDR records of said telephone line.

40. A method according to claim 38, wherein automatically detecting and storing comprises analyzing CDR records of other telephone lines.

41. A method of dial code selection comprising:

automatically storing, at and by a telephone company, a telephone number in a database associated with a particular user or telephone number; and

automatically assigning, by a telephone company, a shortened dial code for the stored telephone number.

42. A method according to claim 41, comprising, receiving an "add to list" command from said user, regarding said telephone number.

43. A method according to claim 41, comprising automatically detecting said number using a DTMF receiver.

44. A method according to any of claims 41-43, comprising automatically detecting said number based on a second user calling said first user.

45. A method according to any of claims 41-43, comprising printing a list of said numbers and said shortened dial codes.

46. A method of data entry into a personal database, associated with a telephone line and stored at a telephone company which services said line, comprising:

automatically detecting requests for connection to another telephone number on said line; and

adding said another telephone number to said database.

47. A method according to claim 46, wherein said requests comprise an incoming call.

48. A method according to claim 46 or claim 47, wherein said requests comprise an outgoing call.

49. A method according to claim 46 or claim 47, wherein said requests comprise an incoming call which left a message on a voice mailbox.

50. A method of automatically updating telephone information in a system comprising:

providing a computer media reader and a database of telephone numbers;

inserting a computer readable storage medium into the reader; and

automatically updating, using a computer, a plurality of individual records in said database, utilizing information read from said medium by said reader, wherein said storage medium comprises an externally maintained database and wherein said database of telephone numbers of said system comprises a personal database.

51. A method according to claim 50, wherein said personal database comprises annotations to records in said externally maintained database.

52. A method of automatically updating telephone information in a system comprising:

providing a computer media reader and a database of telephone numbers; and

inserting a computer readable storage medium into the reader; and

automatically updating, using a computer, a plurality of individual records in said database, utilizing information read from said medium by said reader, wherein said information in said medium comprises records associated with a particular service and wherein said personal database comprises records associated with a plurality of services.

53. A method according to any of claims 50-52, wherein said system comprises a general purpose computer.

54. A method according to any of claims 50-52, wherein said system comprises a dedicated personal information system.

55. A method of personal telephone database management, comprising:

(a) obtaining call data records (CDRs) of at least a particular telephone line;

(b) associating additional information with at least selected ones of said CDRs; and

(c) generating or updating a personal database utilizing said selected CDRs and associated information.

56. A method according to claim 55, comprising generating pseudo CDRs for incoming calls and using said pseudo CDRs to generate or update a personal database.

57. A method according to claim 56, wherein said pseudo CDRs are generated by analyzing CDRs of other telephone lines.

58. A method according to claim 56, wherein said pseudo CDRs are generated by analyzing caller ID data, when calls are made.

59. A method according to claim 56, comprising querying a telephone company for a list of telephone lines which called the particular line.

60. A method according to any of claims 55-59, comprising filtering said CDRs before said associating.

61. A method according to any of claims 55-59, comprising filtering said CDRs after said associating.

62. A method according to any of claims 55-59, wherein said updating comprises updating a personal database at said telephone company.

63. A method according to any of claims 55-59, wherein said updating comprises transmitting a database update to a user.

64. A method according to any of claims 55-59, wherein said updating comprises generating a personal database.

65. A method according to any of claims 55-59, wherein said updating comprises generating an update for an existing personal database.

66. A method according to any of claims 55-59, comprising matching said CDRs against call records from a PBX, to associate CDRs with a particular extension of said PBX.

67. A method according to any of claims 55-59, comprising associating "add-to-list" commands with said CDRs.

68. A method according to claim 67, comprising marking a CDR responsive to an "add-to-list" command received in association with a call which generates the CDR.

69. A method of call data record (CDR) marking, comprising:

receiving, at a telephone company, a command is associated with a telephone call that is received from one of the parties of said call; and

annotating a CDR associated with said call, responsive to said command.

70. A method according to claim 69, wherein said command comprises an "add-to-list" command.

71. A method according to claim 69, wherein receiving comprises receiving via an Internet connection.

72. A method according to claim 69, wherein receiving comprises receiving via a dedicated telephone connection.

73. A method according to any of claims 69-72, wherein said command is received just prior to said telephone connection.

74. A method according to any of claims 69-72, wherein said command is received during said telephone connection.

75. A method according to any of claims 69-72, wherein said command is received just after said telephone connection.

76. A method according to claim 69 or claim 70, wherein receiving comprises receiving via a telephone connection of said call.

77. A method of personal database management, comprising:

providing an external database of telephone numbers;

maintaining a database of annotations of records in the external database; and

automatically generating annotations in said database of annotations responsive to a telephone call usage pattern of individual telephone numbers.

78. A method of personal database management, comprising:

providing an external database of telephone numbers; and

maintaining a database of annotations of records in the external database,

wherein said annotations comprise links to records in the external database.

79. A method according to claim 77 or claim 78, wherein said external database is removable.

80. A method according to claim 77 or claim 78, wherein said external database is located at a remote location.

81. A method of database maintenance for a personal database of telephone numbers stored at a telephone company, comprising:

providing a second database at said telephone company; and

transferring information from said second database to said personal database.

82. A method of database maintenance, for a database of personal telephone numbers stored at a telephone company for a telephone subscriber, comprising:

providing information for updating said database; and

electronically uploading said information, by said telephone subscriber, to said telephone company; and

updating said database using said uploaded information.

83. A method according to claim 82, wherein electronically uploading comprises sending e-mail.

84. A method according to claim 82, wherein electronically uploading comprises uploading via an interactive Internet connection.

85. A method according to claim 82, comprising retrieving information from said database using a second electronic connection.

86. A method according to claim 85, wherein said retrieving uses a same connection type as said uploading.

87. A method according to any of claims 82-86, wherein said information comprises information to be stored in said personal database.

88. A method according to any of claims 82-86, wherein said information comprises instructions for automatic personal database generation or updating.

89. A method of database maintenance, for a personal database of telephone numbers stored at a telephone company, comprising:

generating a request to download information from said personal database;

transmitting said request to said telephone company

electronically downloading said information from said personal database.

90. A method according to claim 89, wherein said electronic downloading comprises downloading directly into a cellular telephone.

91. A method according to claim 89, wherein said request comprises a request for only a portion of the database.

92. A method according to any of claims 89-91, wherein said request comprises a sorting order.

93. A method of managing a voice mailbox stored at a telephone company, comprising:

listing incoming messages on a display associated with a telephone subscriber and remote from said telephone company; and

selectively listening to one of said incoming messages.

94. A method according to claim 93, comprising sending, via carrier wave, elements of said list.

95. A method according to claim 94, wherein said elements comprise an originating telephone number associated with a message on said voice mailbox.

96. A method according to any of claims 93-95, wherein said messages comprises e-mail messages.

97. A method according to claim 96, wherein said listening comprises reading out an e-mail message by said telephone company.

98. A method according to any of claims 93-95, wherein said messages comprises voice messages.

99. A method of requesting information, comprising:

dialing an information-provision system to obtain information;

hanging up after said dialing; and

sending information, by carrier wave, directly to an information system for which the information was obtained, after said hanging up.

100. A method according to claim 99, wherein said information provision system comprises a voice-information provision system.

101. A method according to claim 99, wherein said information provision system comprises an IVR-information provision system.

102. A method according to any of claims 99-101, comprising requesting information from said information provision system.

103. A method according to any of claims 99-101, wherein said dialing acts as an information request from said information provision system.

104. A method according to claim 102, comprising receiving a voice response from said information provision system.

105. A method according to claim 104, wherein said voice response is provided during a call initiated by said dialing.

106. A method according to claim 104, wherein said voice response is provided during a call-back call.

107. A personal database component integrated with a telephone interchange, comprising:

a telephone interchange;

a database including a plurality of entries for telephone numbers and associated information, integrated with said interchange; and

an association of said database with between two and twenty different telephone numbers.

108. A component according to claim 107, wherein said different telephone numbers are used by a single user.

109. A method of creating a telephone book, comprising:

automatically detecting a plurality of telephone numbers for a plurality of telephone calls, including both incoming and outgoing calls for at least one telephone number, by a telephone interchange through which said calls are routed;

a user selecting which of said numbers to store; and

generating a database including said numbers.

110. A method according to claim 109, comprising generating a telephone book containing only those selected numbers.

111. A method according to claim 110, comprising printing said book.

112. A method according to claim 111, wherein said numbers are associated with information and wherein printing said book comprises printing a book including said numbers and said information.

113. A method of interactive voice response, comprising:

vocalizing a menu during a telephone connection;

transmitting non-voice data associated with said menu during said telephone connection, to an initiator of said telephone conversation; and

receiving an input from a user indicating a choice responsive to said transmitted data.

114. A method according to claim 113, wherein said vocalized menu and said data are multiplex on a single telephone connection.

115. A method according to claim 114, wherein said data is transmitted in burst mode.

116. A method of information search comprising:

providing an externally maintained database of telephone numbers;

providing a personal database of telephone numbers;

providing a search criteria; and

matching the search criteria against the two databases to generate a single list of search results.

117. A method according to claim 116, wherein the externally maintained database is locally stored.

118. A method according to claim 116, wherein the externally maintained database is remotely stored.

119. A method according to claim 116, wherein the personal database is stored at a remote location from where the search criteria is provided.

120. A method according to claim 116, wherein the personal database is locally stored.

121. A method according to claim 116, wherein the external database is at least 100 times as large as the personal database.

122. A method according to claim 116, wherein said personal database comprises a plurality of personal databases.

123. A method according to claim 122, wherein at least two of said plurality of personal databases are stored at different locations from each other.

124. A method according to any of claims 116-123, wherein said externally maintained database comprises a plurality of databases.

125. A method according to claim 124, wherein at least two of said plurality of externally maintained databases are stored at different locations from each other.

126. A method according to any of claims 116-123, wherein matching comprises matching first against records in a cache.

127. A method according to claim 126, wherein said cache comprises telephone numbers for a particular geographical location.

128. A method according to claim 126, wherein said cache comprises recently used telephone numbers.

129. A method according to claim 126, wherein said cache comprises frequently used numbers.

130. A method according to any of claims 116-123, wherein said matching is limited to a certain geographical location.

131. A method according to any of claims 116-123, comprising ordering said list of search results.

132. A method according to claim 131, wherein said ordering comprises ordering by frequency of connection with said numbers.

133. A method according to claim 131, wherein said ordering comprises ordering by a geographical criteria.

134. A dedicated information system consisting essentially of:
a mass storage device comprising a database of telephone numbers;
an input means for entering search criteria; and
a central processing unit, which performs searches on said telephone numbers; and
an output means for displaying results of said searches,
wherein said mass storage device is directly connected, without a bus, to said central processing unit.

135. A dedicated information system, comprising:
a memory comprising a first database of telephone numbers;
a removable mass-storage media comprising a second database of telephone numbers;
an input for entering search criteria, for searching said databases; and
a display for displaying search results,
wherein, said system requires no prelude input to enter search criteria.

136. A system according to claim 135, wherein said system includes a cache comprising a database of geographically related telephone numbers.

137. A method of delivery tracking, comprising:

detecting an incoming telephone number on an incoming call, which telephone number is provided by carrier wave;

retrieving a record of information associated with said telephone number;

printing said associated information unto a printable substrate; and

attaching said printable substrate to an object who delivery is required.

138. A method according to claim 137, comprising delivering said object, responsive to said associated information printed on said attached printable substrate.

139. A method according to claim 137, wherein said information is stored in an externally maintained database.

140. A method according to any of claims 137 - 139, wherein said information is stored in a personal database.

141. An information system, comprising:

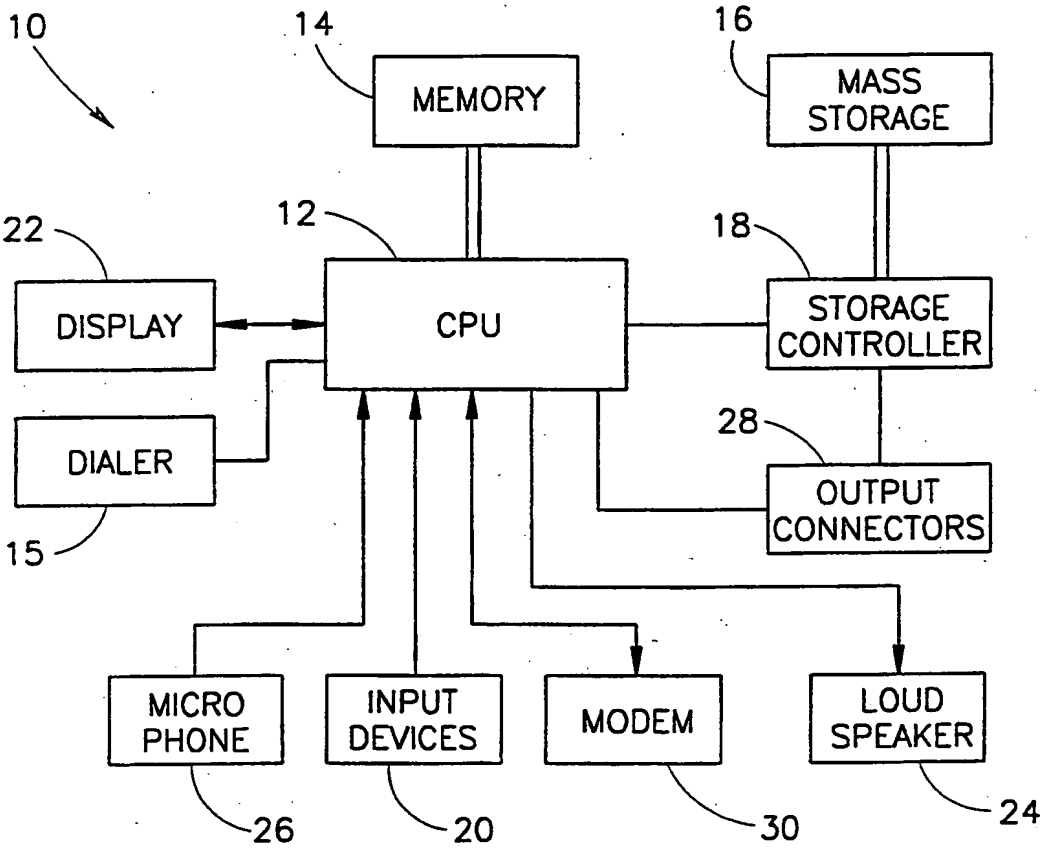
a mass storage device, comprising an externally maintained database;

a memory comprising a personal database;

a docking station for connecting electronic organizers to the system; and

a processing unit which downloads information from said databases to said docking station, to update an organizer.

142. A system according to claim 141, wherein said docking station comprises a network connection and wherein a plurality of organizers are connected to said network.


10
14
MEMORY
16
MASS STORAGE
22
12
18
DISPLAY
CPU
STORAGE CONTROLLER
DIALER
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OUTPUT CONNECTORS
15
MICRO PHONE
INPUT DEVICES
MODEM
LOUD SPEAKER
26
20
30
24

FIG.1

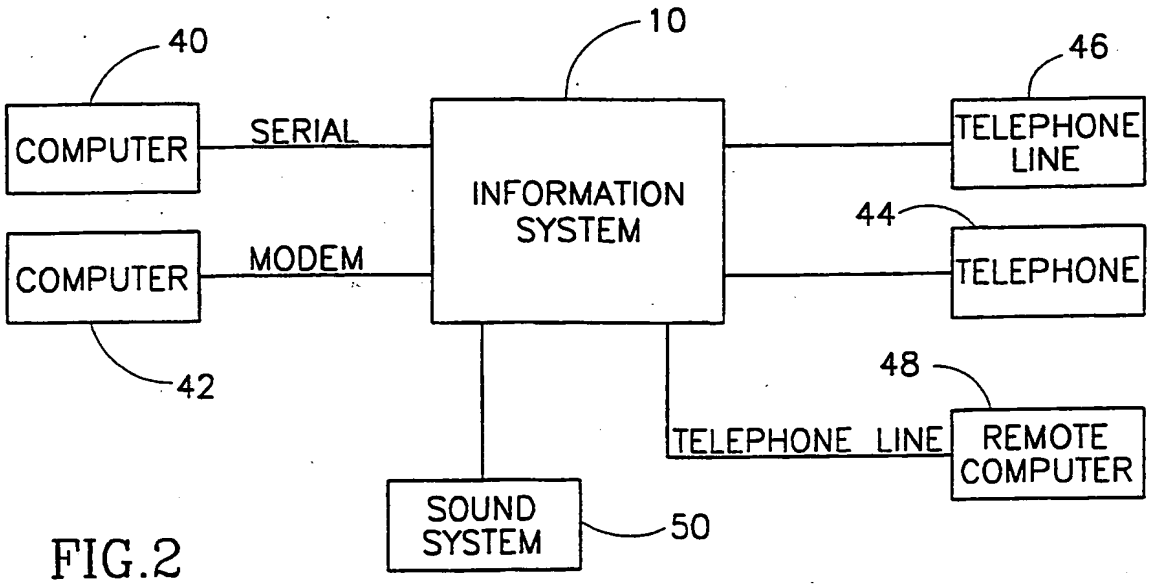
40
10
46
COMPUTER
SERIAL
INFORMATION SYSTEM
TELEPHONE LINE
44
COMPUTER
MODEM
TELEPHONE
42
48
TELEPHONE LINE
REMOTE COMPUTER
SOUND SYSTEM
50

FIG.2

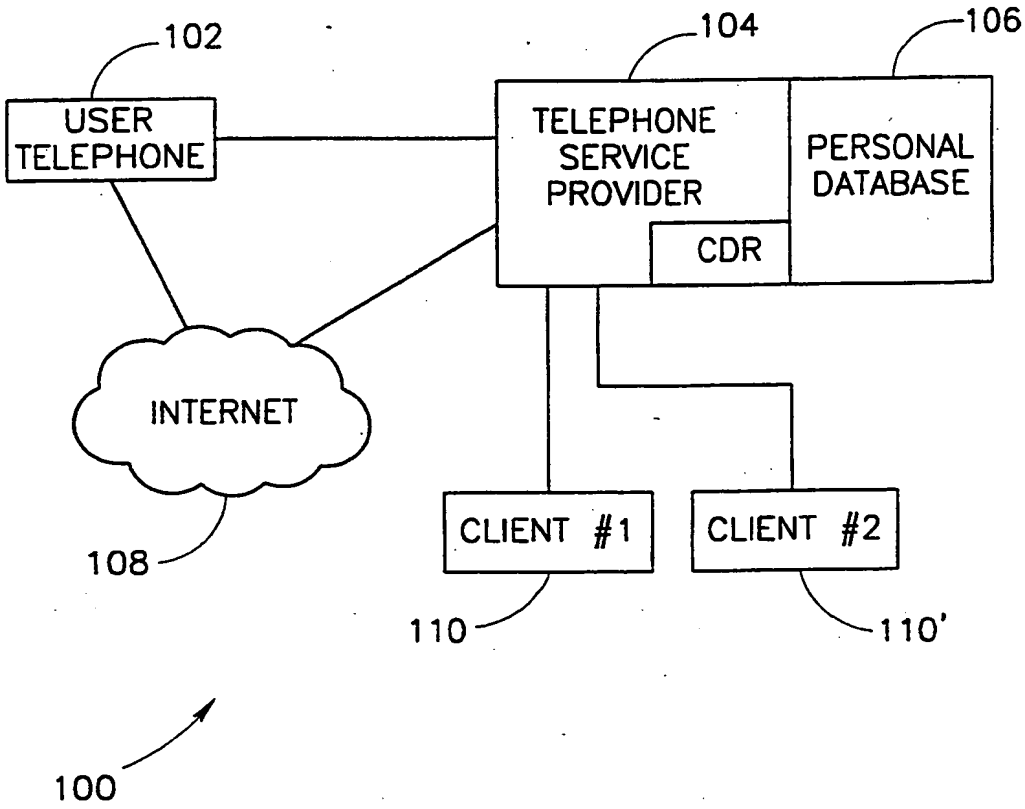
102
104
106
USER TELEPHONE
TELEPHONE SERVICE PROVIDER
PERSONAL DATABASE
CDR
INTERNET
108
CLIENT #1
CLIENT #2
110
110'
100

FIG.3

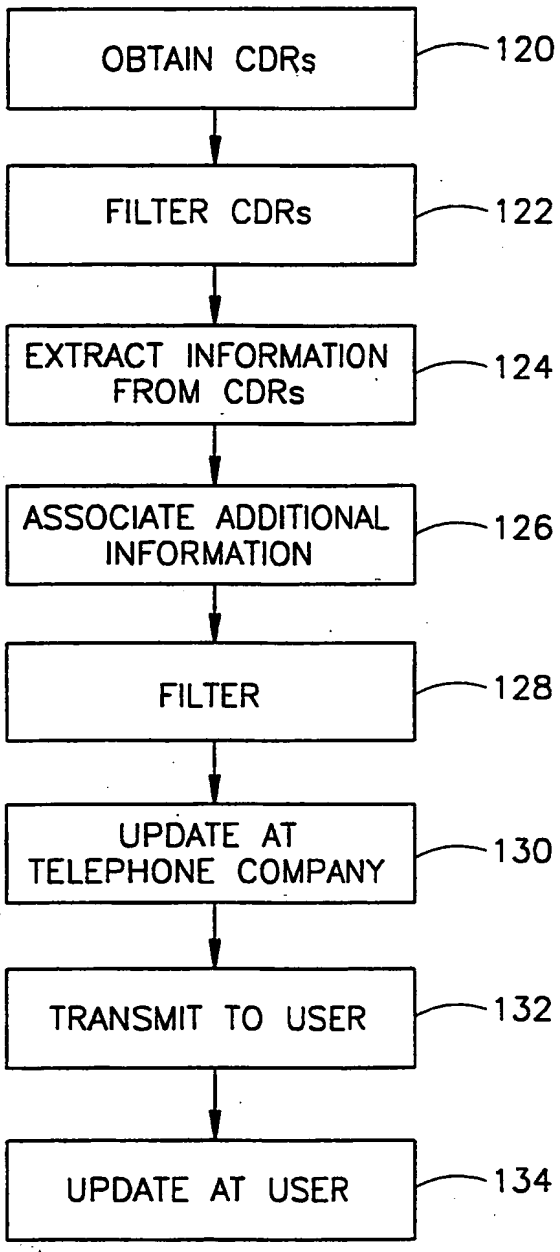

FIG.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00206

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04M 1/00, 1/56, 3/00, 11/00, 15/06

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 5,903,632 A (BRANDON) 11 MAY 1999, SEE ENTIRE DISCLOSURE.	1-142
Y	US 5,394,445 A (BALL ET AL.) 28 FEBRUARY 1995, SEE ENTIRE DISCLOSURE.	1-142
Y	US 5,546,447 A (SKARBO ET AL.) 13 AUGUST 1996, SEE ENTIRE DISCLOSURE.	1-142

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
01 AUGUST 1999

Date of mailing of the international search report
30 AUG 1999

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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00206

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

379/90.01, 91.01, 93.05, 93.06, 93.07, 93.17, 93.18, 93.19, 93.21, 93.23, 110.01, 111-113, 120, 133, 140, 142, 201, 354-357, 396

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

379/90.01, 91.01, 93.05, 93.06, 93.07, 93.17, 93.18, 93.19, 93.21, 93.23, 110.01, 111-113, 120, 133, 140, 142, 201, 354-357, 396